The FOUNDRY

Volume 55
Number 3

Published
Semimonthly

CLEVELAND, OHIO, FEBRUARY 1, 1927

Tractors Ride on Belts of Steel

ABOUT 20 years ago while trying to develop a piece of agricultural equipment that would negotiate successfully the marshy but fertile lands of the San Joaquin delta near Stockton, Calif., Benjamin Holt invented the familiar type tractor which carries its own track, lays it down, rolls over it, picks it up, lays it down again *ad infinitum*. This idea spread rapidly in agricultural sections throughout the world where the bearing and tractive properties of the soil were poor. Shortly after the outbreak of the recent war the caterpillar traction principle was adapted to heavy pieces of ordnance and tractors employing that principle were used to carry heavy loads over the rough terrain. Perhaps the most spectacular application of a machine moving on tractor shoes was found in the famous tanks which aided the infantry so successfully. Production of tractor shoes for new units and for replacement required an enormous plant capacity during the war. In recent years the caterpillar tractor idea has been applied to a variety of machines which must travel over soft soil. In addition to the gasoline tractor, steam shovels, excavators, ditching machines, road building machinery, trucks, etc. now move on steel belts. Tractor shoes are made in the foundry from either alloy or carbon steel, depending upon the requirements in service of any particular field.

Tremendous Requirements Were Placed on Tractor Shoes Carrying Tanks in Service in France

Find Where Castings Can Be Sold

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PUBLISHED BY THE PENTON PUBLISHING CO., CLEVELAND, O.

BRANCH OFFICES

BOSTON ..... 1037 Old South Bldg.
CHICAGO ..... 1147 People's Gas Bldg.
CINCINNATI ..... 209 Edwards Bldg.
NEW YORK ..... 2203-2206 No. 220 Broadway
PITTSBURGH ..... 2148-49 Oliver Bldg.
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FOREIGN OFFICES

BIRMINGHAM, ENGLAND ..... Prince's Chambers
LONDON, ENGLAND ..... 2-3 Caxton House Westminster, S.W.1
PARIS, FRANCE ..... No. 9 Rue de Londres
BERLIN, GERMANY ..... Kurfurstendamm 136, Berlin-Halensee

Cable address, IROTRAPEN, London

SUBSCRIPTION

United States and Mexico ..... $3.00 a year
Canada ..... $4.00 a year
Great Britain and other Foreign Countries ..... £1:0:0 a year
Single copies ..... 25 cents

Copies published three months or more previous to date of current issue, 50 cents each

Member, Audit Bureau of Circulations, Associated Business Papers, Inc., National Publishers Association

Entered at the Post-office at Cleveland as Second Class Matter

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LAYOUT CHANGES

Removal of Useless Partition Facilitates Production and Increases Floor Space

By
Frederick Heitkamp

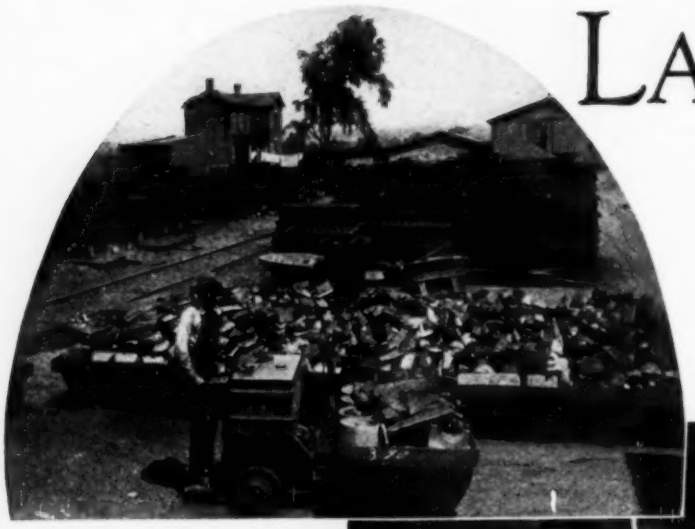


Fig. 1—Above—Charges are made up on skids and handled on electric trucks to the cupola floor. Fig. 2—Right—A teapot mixing ladle catches metal from the spout. Fig. 3—Below—Shielded hoist ladles pour the work on the light molding floors

RECENT improvements at the plant of the Modern Foundry Co., Cincinnati include changes in the foundry layout and in methods and equipment used. Walls have been torn down, aisles straightened, heavier cranes installed and floor space heretofore wasted, has been utilized to an extent that released 40,000 square feet of floor space in a separate building heretofore occupied by different departments of the foundry. These changes for efficiency are in keeping with the policy to keep active step with the trend of the times which encourages self-examination and self-improvement in industrial plants.

Castings of the Modern Foundry are consumed entirely by some of the leading machine tool companies of Cincinnati, therefore the quality of the metal must be of the highest standard. The iron enjoys a reputation for its close grain and for its appearance after machining, even where the sections are extremely heavy. It is strong iron. Many of the castings are semi-steel with a tensile strength of from 33,000 to 35,000 pounds. All other castings show between 26,000 and 28,000 pounds per square inch when tested in this manner.

All patterns are mounted on boards or iron plates and all flasks are planed on the joints. All molds for large castings are dried resulting in columns, beds, bases and large castings without

GE Brings Operating Economies

swells and heavy fins. These castings are placed on the planer bed for machining in rather large quanities on a production basis. This practice would not be possible if there was any great variation in the castings.

In revising the layout to give the present floor plan, the sequence of operations was considered carefully that the work should go efficiently through the foundry from the molding to the assembling department, to the pouring department and then on to the cleaning bay and to the shipping department for delivery to the machine shops. All criss-cross movement of materials has been eliminated so far as possible and the work moves from one department to another without delay and interference of any kind.

Drawings from the machine tool manufacturer are delivered to the pattern shop. Here the drawings are converted into tangible patterns in the shortest possible time by expert workmen. The wood patternmakers have their benches lined up in one row over which is operated a light crane for lifting heavy patterns and coreboxes, thus relieving the patternmakers of as many of the fatiguing physical movements as possible. Many patterns are cut out of solid chunks of wood made by gluing together several pine

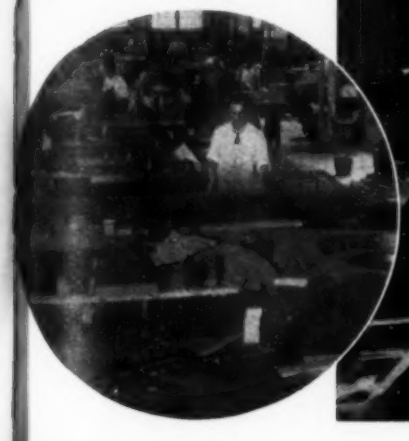


Fig. 4—Below—A complete pattern shop is available. Fig. 5—Right —An extensive core department is necessary for the class of work handled by this foundry. Fig. 6—Above—Core racks are transported on an electric driven lift truck

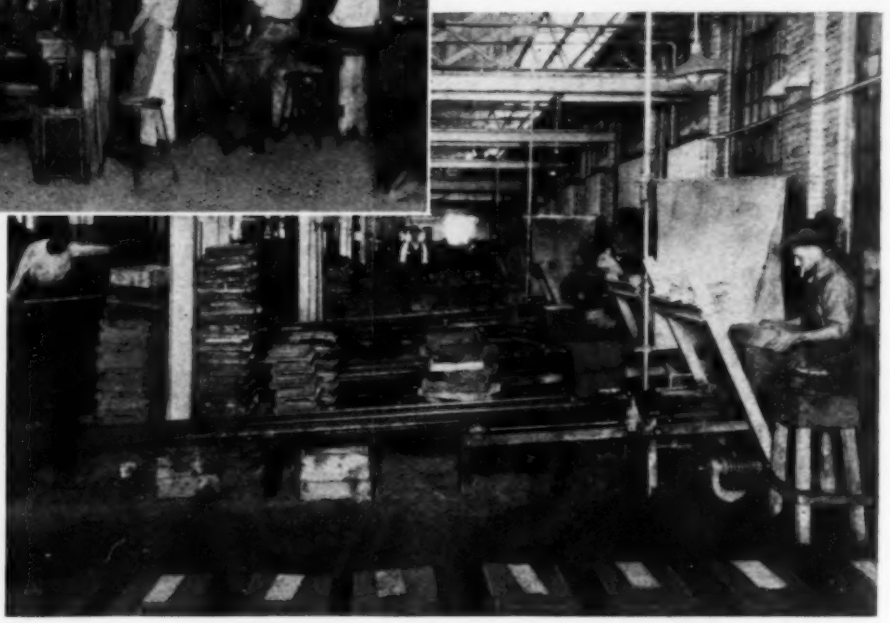


Fig. 7—Left—Small cores are made in a special coreroom on the second floor. Fig. 9—Below—Bench molds travel on skids from the machine to the floor

board sections. The blocks are allowed to dry in the glue press.

Modern woodworking machinery is grouped in the center of the shop and principally consists of jointers, thickness planer, band saws, large sanders, small sanders, a wood milling machine, a radial drill, small *M*-type miller, two drill presses and other similar tools used in connection with metal pattern work and the mounting of patterns. In the far end of the bay is located the stockroom which is closed, and in which is kept all material and supplies issued by requisition as supplies are used. Adjacent to this stockroom is the painting bench where all patterns are painted before they go into the pattern storage.

The pattern storage room located immediately adjacent to the pattern shop contains a great variety of patterns. The pattern storage department is equipped with a 3-ton power crane for lifting and stacking heavy patterns and coreboxes. The smaller patterns are all stored in steel bins in a room adjacent to the large pattern storage at the end of the pattern shop.

The large coreroom where cores ranging in size from 3 inches to 12 feet are made is shown in Fig. 14. In this coreroom are used four roll-over jolt machines similar to the one shown and made by the Osborn Mfg. Co., Cleveland, on which practically all the regular run of cores for castings are made. In the illustration the machine is shown just after drawing the corebox away from the core. Coreboxes seen in the foreground are made rigid to stand severe service on the jolt machine so that they will not spring and make the cores larger. Cores, when assembled, must all come within gaged limits before they are sent to the molding floor to be assembled in the mold. Core racks are transported from place to place

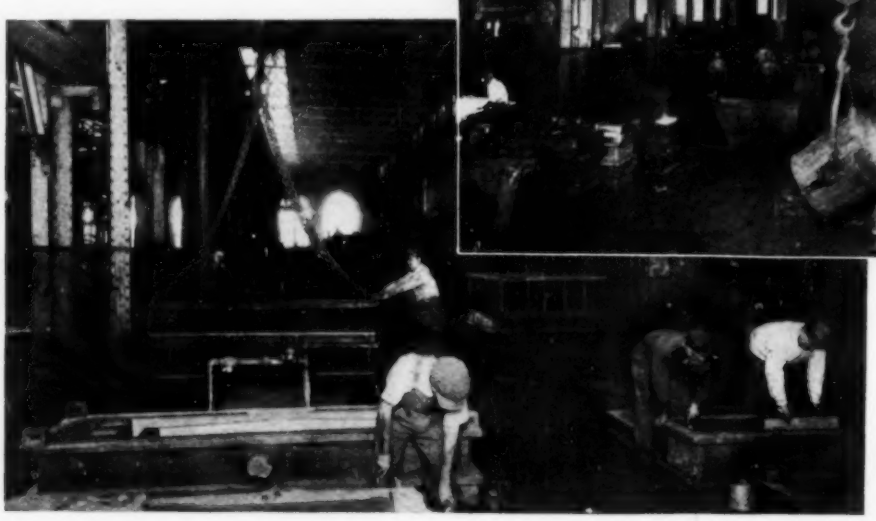


Fig. 8—Left—After the heavy molds are jolted they are taken to the end of the floor for baking. Fig. 10—Above—Pouring heavy molds in the main bay

Fig. 11—Below—Preparing a pit for the mold of a long grinder bed. Fig. 13—Right —A scale truck in the yard is provided to weigh material for the charge

on a 6-ton electric lift truck made by the Elwell Parker Co., Cleveland.

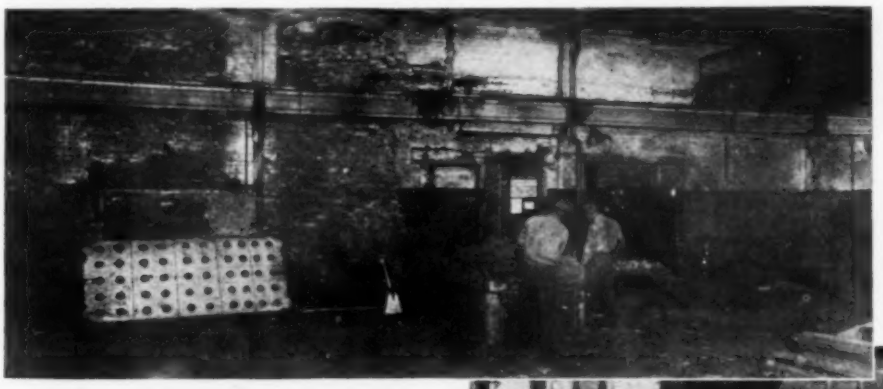
Truck sides are rigid which eliminates blocking between the several tiers as the cores are stacked. This makes them much safer for transporting in and out of the oven. Two 3-ton power cranes are used to move the heavy material. All the bench cores are made in a small coreroom on the second floor.

The coremaking department is equipped with four oil-fired steel ovens. Core sand bonded with linseed oil is mixed in an intensive mixer made by the National Engineering Co., Chicago.

In the illustration, Fig. 6, an electric lift truck of 6-ton capacity is shown putting a loaded rack of cores in the oven. The truck also removes the trays after they have been dried and in addition, delivers the assembled cores to the various molding floors.

Small cores are made on the second floor on the benches shown in Fig. 7. The prepared core sand is delivered to the center of the square of benches around which the coremakers work. These benches are equipped with small hoppers which are kept full of sand by the department laborer, eliminating the necessity of having boxes of sand standing at the side of the workmen and in the way.

This department has excellent lighting facilities, a great aid in making small cores. The I-beam shown in the upper left corner carries a hoist on a trolley which lifts the container of mixed sand from the first floor and carries it across the small coreroom to the center of the square sand reservoir. Racks for the small cores are located in convenient positions for receiving the finished green sand cores.



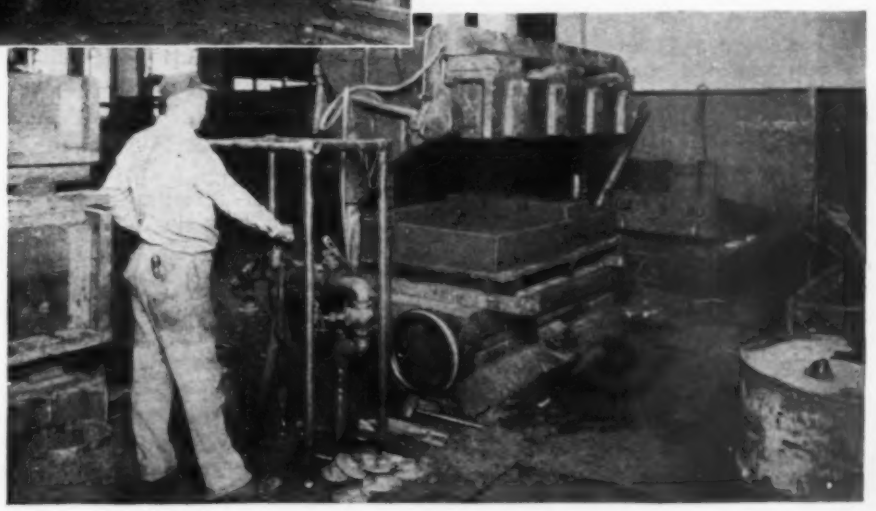


Fig. 12 — Above — Refuse sand is dropped through a grating in the floor. Fig. 14—Right—Large cores are made on a rollover machine of this type

These racks are manufactured of structural steel in connection with cast-iron bottom plates and legs and are so designed that hand operated lift trucks can be run under them. By this means, they are transported in and out of the ovens and around the department. Immediately above the rack may be seen the hoist referred to in a previous paragraph, which brings the container of sand to the center bin for the coremakers.

Squeezer machines shown in Fig. 9 are equipped with automatic devices for carrying the molds away from the machine, thus eliminating on the part of the molder the arduous task of carrying the molds out on the floor and thereby increasing production from 20 to 30 per cent. This device is operated by a pneumatic cylinder which pushes the molds down a slightly inclined track. As many as 30 molds can be pushed down the track at one time. This device was developed and patented by the Modern Foundry Co. Laborers lift the molds from these tracks by a lifting device hung on a light crane. This equipment is supplied for every machine.

Molds are poured from a ladle and pouring device suspended from the crane. This method is safer than pouring with a shank ladle. Canvas curtains between the machines protect the operator's eyes from loose sand blown into the air by the molders.

Fig. 3 taken during the pouring period in this department shows the molders pouring the iron with a specially designed pouring device equipped with a shield and a 300-pound bull ladle suspended from a light crane way. A light chain block facilitates rapid adjustment up and down. The same overhead crane and lever handle are used to remove the molds from the tracks and set them in the line shown, getting them ready for the pouring operation.

An iron platform mounted on four wheels, carries the ladles when they are taken to and from the department by electric lift trucks. Concrete gangways throughout the plant are kept clean at all times for passage of these molten metal-laden trucks.

The 280-foot bay in which all large and medium sized molds are rammed on molding machine equipment is shown in illustration Fig. 8. This equipment includes two rollover jolt machines made by the Osborn Mfg. Co., Cleveland, which will take flasks up to 6 feet. Large molds are jolted on a plain jolt machine with a table top 6 x 12 feet. After the molds are jolted, they are carried to the end of the shop by the crane where patterns are drawn and molds finished and blackened. From here the molds go into the battery of ovens at the right of the shop, where they are dried over night.

Attention is directed to the fact that tracks for the ovens extend through to the bay on the left where all the medium and large size molds are assembled and poured. Oven trucks loaded with dry molds are pulled directly into the assembly bay where the molds are unloaded and laid out on the floor to be cored and assembled. A night shakeout force is employed to take out all flasks and molds and get them ready for use early the next morning.

Another interesting view of the assembly department is shown in Fig. 10. In the foreground molds have been closed and are in the process of being poured. The cupola pouring a steady stream of metal into the teapot ladle is to be seen in the background, while one of the large ladles containing the molten iron is shown suspended from the crane.

Long grinder bed castings are made in the pit shown in the foreground, Fig. 11. These bed castings vary in length up to 31½ feet. In the bay to the left, all molds are rammed on jolt and jolt rollover machines. This department is equipped with three cranes 5, 7½ and 15-ton capacities, made by the Harnischfeger Corp., Milwaukee. Solid and substantial flasks prevent strains in the mold and the resulting swells and uneven surfaces on the castings. This heavy type of construction also prevents the flasks from warping although they are exposed to the intense heat of the drying oven every night.

Part of the neatly arranged yard immediately back of the cupolas, is shown in Fig. 1. Electric lift trucks are equipped with scales. In Fig. 13, an operator is shown making up the charge by putting on so much of each kind of pig iron and scrap by weight, according to the analysis desired.

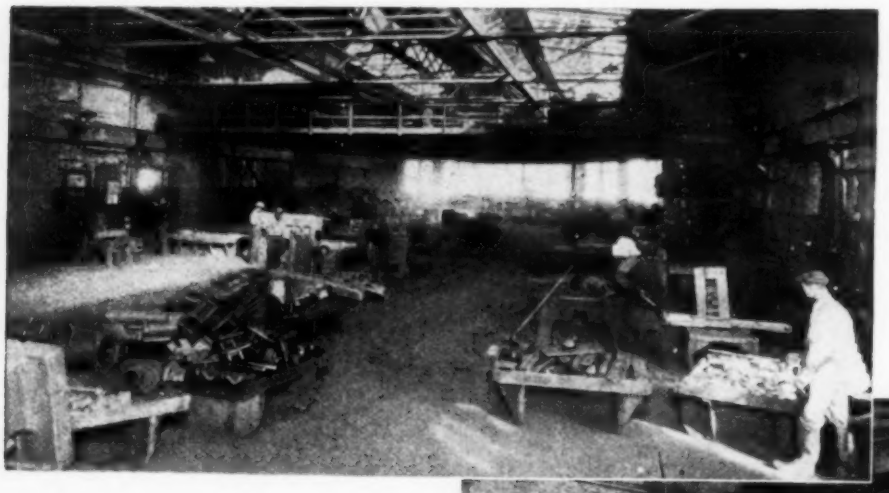


Fig. 15—Left—An extensive cleaning room is in operation. Fig. 16—Below—Castings are carried into and out of the cleaning room on skids

The loaded trucks, Fig. 1, now are ready to go to the elevating platform. This illustration also shows the yard in the rear of the cupola elevator. In the foreground may be seen a number of lift truck trays containing the daily charges of iron going into the two cupolas which are used on alternate days and which have an inside diameter of 72 inches. Each charge weighs 2000 pounds and is made up by the laborer as indicated. Two hundred and twenty-five pounds of coke is used per charge. The scrap content varies from 40 to 60 per cent including steel rail scrap according to the mixture. The remainder is pig iron.

The cupola charges are taken to the elevator by electric lift trucks. Buggies of coke are transported in the same manner. This system of loading the cupolas has materially reduced the cost of the metal at the spout. The former method of assembling the materials on the charging floor necessitated a scale and different kinds of pig iron and scrap around the cupola charging door and caused expensive congestion and inefficiency. Two elevators are provided. One takes up the loaded trays of pig iron and buggies of coke. The other elevator brings the empties down. In the back ground, Fig. 1, flasks are shown stacked up behind boards on which are placed the flask numbers. Flasks returning from the foundry always are sent to the same location.

Method of catching, mixing and transferring metal at the spout of the cupola is shown in Fig. 2. The metal flows into a stationary teapot mixing ladle with a capacity of about 5000 pounds. From the teapot ladle the metal is poured into the 3000-pound truck ladles which distribute it throughout the shop. The teapot mixing ladle is electrically operated from the platform by the cupola operator. This type of ladle insures continuous mixing of the metal.

Cleaning the Castings

A view of the cleaning room is shown in the illustration, Fig. 15. The foreground shows a series of gratings over pits which contain large iron boxes. Cores from large castings are dug out over these gratings and the core sand dropping into the boxes below, is removed by cranes and taken to the burned sand tipple. The molding sand used is from the Zanesville, O., district. The sand is not reclaimed. The iron is taken out by a magnetic separator and the old sand is sold to fertilizer manufacturers.

An idea of the size of the cleaning room may be gained from the illustrations, Figs. 15 and 16. Castings are brought in on the left side of the room and placed over the shakeout gratings. From here the castings go into one of the various sizes of tumbling mills shown lined up near the left wall. On the right wall are the benches for the chippers and dressers who prepare the castings to go into the machine shop. Castings are given a priming coat of paint before they are shipped to the machine shop.

Castings Are Ground

In the far end of this department are located the grinding stands where all castings are ground and filed before they are shipped. This department is equipped with a 3 and 5-ton power crane to expedite the handling of the large castings.

A close up view of the battery of grinders is shown in illustration, Fig. 16. The smaller tumbling mills with the finished work in the foreground also are shown. Castings are piled on lift truck trays so that they can be quickly removed after they have been sorted. Having been cleaned, chipped and dressed the castings then are taken to the painting booth shown in Fig. 17 where they are sprayed. This booth is equipped with electric exhaust fans and all large castings receive their priming coat of paint here. Insides of castings are painted before going into the machine shop because it is much easier to paint at that time than to wait until castings are bored and machined since paint would get into bored holes on machined surfaces. The outside coat is put on because it is the basic coat for the remaining finishing coats and it is desirable to have this coat well set. Lacquer paint of any well known manufacture is used. The operator wears a respirator as a protection against paint spray mist. Note the electric lights giving illumination to this booth.

Through a rearrangement of departments, equipment and methods an increase of efficiency ranging from 20 to 60 per cent has been obtained in the various departments. By knocking out interfering walls, by allowing free passage from one department into another, by more efficiently occupying existing space through a more orderly and systematic arrangement of machines and equipment, 40,000 square feet of floor space have been reclaimed for additional expansion and activity. In other words, straight lines of production were obtained throughout the shop.

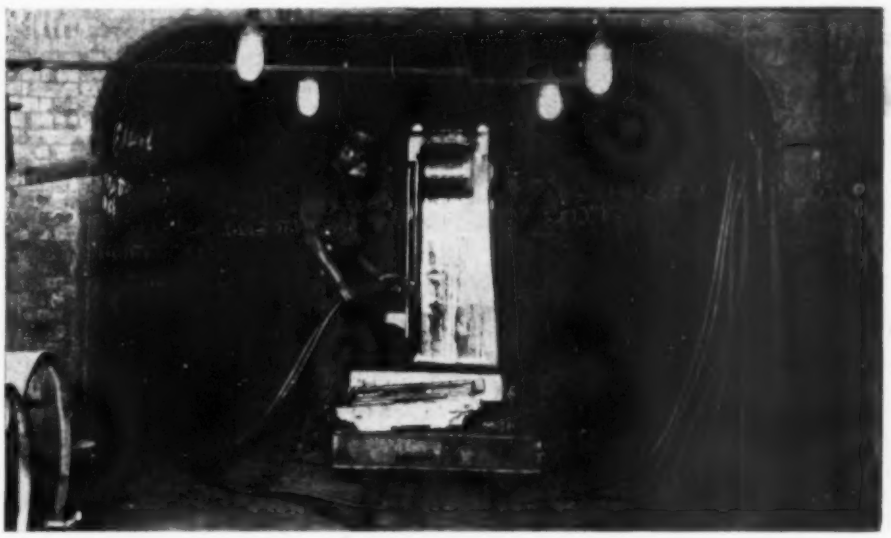


Fig. 17—Finished castings are given a coat of paint before they are taken to the machine shop

Describes Apparatus

Various types of torches, tips, regulators, and other equipment and accessories for welding and cutting are described in a vest pocket catalog recently published by the Alexander Milburn Co., Baltimore. The apparatus is made in various sizes to fit the industrial use and includes torches for using illuminating or natural gas.

Goes to Salt Lake City

M. B. Urquhart, formerly northwestern manager, Keystone Lubricating Co., Philadelphia for 20 years, has resigned to become western manager of the Philadelphia Grease Mfg. Co., Philadelphia. His office will be located in the Ideal building, Salt Lake City, Utah.

Mold Stern Frame in British Shop

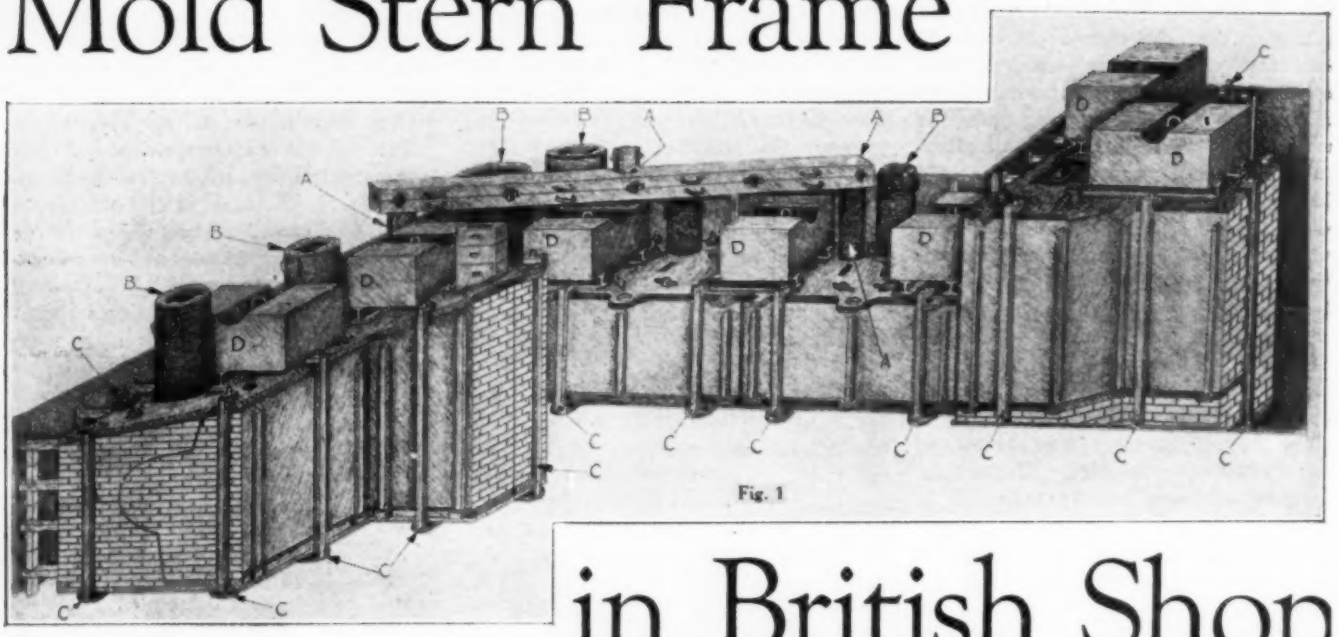


Fig. 1

By H. V. Fell

MANY interesting features outside the usual foundry practice appear in the method used in a notable British steel foundry when molding the large steel casting illustrated in Fig. 2, the main portion of a ship's sternframe.

Special attention is directed to the template arrangement, Fig. 5 provided for making the tackle necessary for the subsequent molding operations.

For simplification, the template is illustrated as one piece. In actual practice this would prove somewhat unwieldy, therefore, it usually is divided into sections, according to the judgment of the person in charge of the work.

In commencing operations, the first task is to excavate a suitable pit for the work in hand. This done, the plates *A* are placed in position as shown in Fig. 3. Use of these plates is threefold. They provide a firm foundation for the brickwork, etc. They prevent steam arising from the earth below during the drying process, which would cause large cracks to appear on the face of the mold. They enable the whole mold to be clamped together, after closing, as shown at *C*, Fig. 1. It is advisable also to place plates at the sides of the pit as at *B*, Fig. 3. These not only will prevent the pit wall from caving in, but are necessary for the propping arrangement to be explained later.

Pattern Is Slanted

After these preliminary arrangements are completed, the pattern is set up on temporary pedestals of bricks and lengths of timber as shown at *C*, Fig. 3, and taken out of wind by the use of straight edges and line, etc. During this operation the pattern is set finally in a sloping position, approximately 1 foot in 25. This is essential for the metal flow during the casting period.

Suitable weights are placed at suitable points to prevent any movement of the pattern during the ramming operations, and then the positions of the walls are marked. The inside wall to the contour of the pattern at *A*, and the outside wall as shown at *B*, Fig. 4. When ramming material into the space between these walls, it is advisable to use dry sand, cinders, pieces of old brick, etc., to approximately 6 inches from the pattern. The remainder of the space then is filled by placing a layer of facing composition against the pattern and backing the facing with floor sand.

After ramming the facing sand, etc., firmly under the pattern, the temporary pedestals and pieces of timber which support the pattern at *C*, Fig. 3, are removed, and sand is

Fig. 2—The Pattern Used.
Fig. 3—Pattern Supported on Brick Piers in the Pit

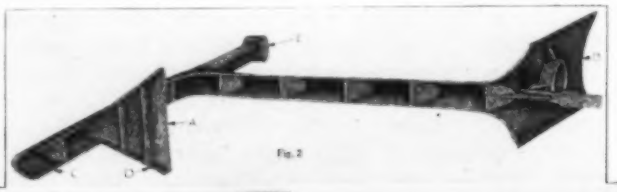
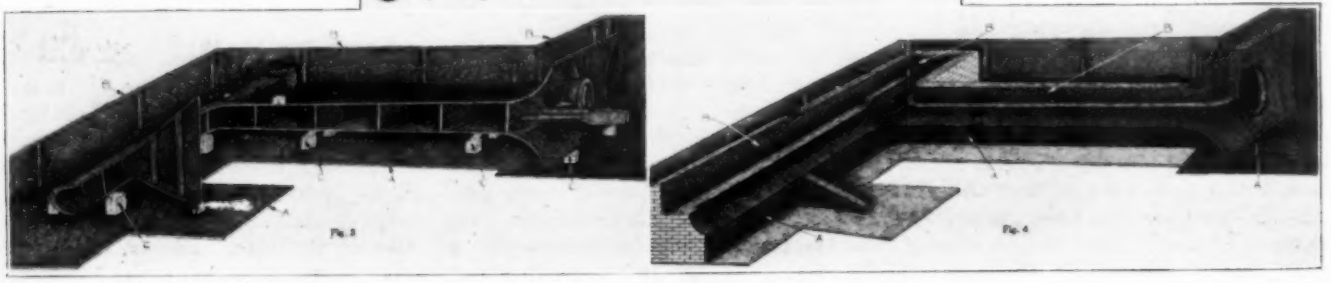


Fig. 4—The lower part of the mold showing the partings made



rammed into the cavities left by their removal. The outer wall *B* then is completed and the joints made as shown at Fig. 4.

At this stage it is important for those in charge of the work to look well ahead and visualize the subsequent operations so that these will not be held up through lack of working tackle. Several members of the crew working on the job are delegated to mold the necessary drawback, top plates, grids, etc. The remainder of the crew continues to work on the bottom portion of the mold.

In describing the molding of the tackle the template, Figs. 5, 6, 7 and 12, plays a prominent part. The size and shape shown are only approximate, but will suffice for the explanatory purpose.

The first items of the tackle wanted are the drawback plates, Fig. 6, therefore, the positions of the divides are determined, after which the template is placed on the pattern and marked off as shown. In this instance only the inside contour of the template is utilized. Divisions and other particulars are marked as per illustration.

The large crosses *A* indicate the position of the lifting hooks, and the small crosses *B*, the position of the hooks necessary for holding down the straight cast irons, bars, etc., *H*, Fig. 8.

Molds for these straight cast iron bars are stamped on an open sand bed by the pattern board, Fig. 9. The square holes, *C*, Fig. 6, are for the insertion of the bars, *F*, Fig. 13, which provide back support for the backplate *I*.

Fig. 7 illustrates the template marked off for the grids. Molds for these are stamped by hand on a level sand bed after their dimensions are marked from the template. It is advisable to divide them into sections as shown in Fig. 12. This will enable the operators to place them in their respective positions by hand. Care must be taken when dividing these to make sure that the division points correspond with the divisions of the top plates. Prodders are added as shown at *G*, Fig. 13. These help to support the hanging sand of the top parts.

Fig. 10 shows the template marked off for the top plates Fig. 11. The oblong holes *A* facilitate insertion of packing between the grids and the top plates. The round holes *B* are for the insertion of the hooks by which the grids are toggled to the top plate. The lugs *C* provide a means for lifting and handling these mold sections. The large holes *D* are for the hook of the chain used in turning the top plates over for finishing etc. The small square holes *E* are sockets for the insertion of steel bars. These bars coupled with pieces of timber as shown at Fig. 24, provide a support for the sand etc. of the top parts while turning over.

Detail of Molding

In returning to the molding operations the drawback plates are placed in position on a loam bed, in which pieces of suitable iron or steel packing have been placed as shown at *K* Fig. 13. The plates then are hammered down firmly on the loam. This metal packing is necessary. It insures a firm and level base, and if omitted, will cause a variation in the space between the walls of the mold and a corresponding variation in the metal thickness of the casting.

The joint walls *B* and *C* Fig. 8 now are built up and lengths of plate packing are placed on these as shown at *D*. These walls support the straight irons *H* and carry the overhanging sand etc. of the drawbacks. The whole then is rammed up in the usual way, with small brackets placed at the web sections, as shown at *A* Fig. 15, 16 and 17, to prevent fractures at these junctions. The straight irons also may be augmented by the inclusion of portions of old top gratings, etc., at approximately the half-way line of the drawback. These also may be held in position by the hook arrangement *F* Fig. 8, and *J* Fig. 13, thus securely binding the sand projection of the drawbacks. Cinders are packed freely in the drawbacks for venting purpose and also to facilitate the drying and easing process later.

Operations then are continued by the formation of the deep joints shown in Fig. 14. These provide a suitable and safe arrangement for locating the top section. The dividing boards Fig. 18, are placed in their respective positions as at *A* Fig. 14 and the grids Fig. 12 are located. Gaggers are suspended from the grids as shown at *A* Fig. 13.

The head or feeding allowance is added as shown on the casting sections Figs. 41, 42 and 43. Loose pieces of wood shaped to the required dimensions are used for the formation of these heads. Ramming then is continued until the sand is level with the top of the grids *B* Fig. 13.

Now it is necessary to try on the top plates temporarily so that the position of the toggle hooks and grid packing may be determined. A layer of loam is placed on top of the walls and over this a liberal supply of parting sand is sprinkled to prevent the loam from adhering to the top plates.

British and American Practice Differs

METHODS pursued in a British foundry in the production of large steel castings of which the stern frame illustrated is a typical sample, serve to emphasize the growing tendency of American and British foundry practice to drift apart. On one side of the ocean the pattern work is held to a minimum. The molder is expected to do nearly everything himself. The method develops a high degree of individual skill, ingenuity and resourcefulness. Time is not the all important fetish it is in America and the molder's main consideration is a desire to turn out a mold that in general appearance, regularity of outline and surface finish, will measure up to the highest standards set in the industry.

Industrial conditions in American foundries have resulted in the development of simplified practice. Before a prospective casting passes the blueprint stage it is analyzed and dissected to determine the easiest way of making it. When the pattern finally arrives in the foundry it is in such shape that a gang of men with little or no training can make a satisfactory mold from it. For example a half pattern with core print attached and possibly half a dozen coreboxes would suffice for the stern frame. The half pattern would be used to get the bottom face of the mold. The remainder of the mold would be formed with cores made and dried in a separate part of the foundry and afterward assembled as readily as the numbered members in a steel bridge or steel building.—THE EDITORS.

These then are tried on and after they have been adjusted satisfactorily they are hammered down on the loam to form a firm bearing. The hook and packing holes are marked by sprinkling a suitable white or other distinctly colored substance around the edges. After the top plates are removed, the hooks *C* and packing *D* Fig. 13 are placed in the positions marked. The layer of loam on the walls then is trimmed and the ramming continued until the sand is flush with the top.

With everything ready the top plates are again located and the grids below secured to them by the hooks *C* and toggles *E* Fig. 13. The dividing boards then are removed preparatory to stripping the mold. This provides a clearance between the top sections when dismantling, and thereby prevents a portion of the top parts being pulled away during this operation.

However, it is advisable to examine the toggles thoroughly to see if they all are secure before lifting off the top plates, otherwise much trouble may be caused through a bad lift.

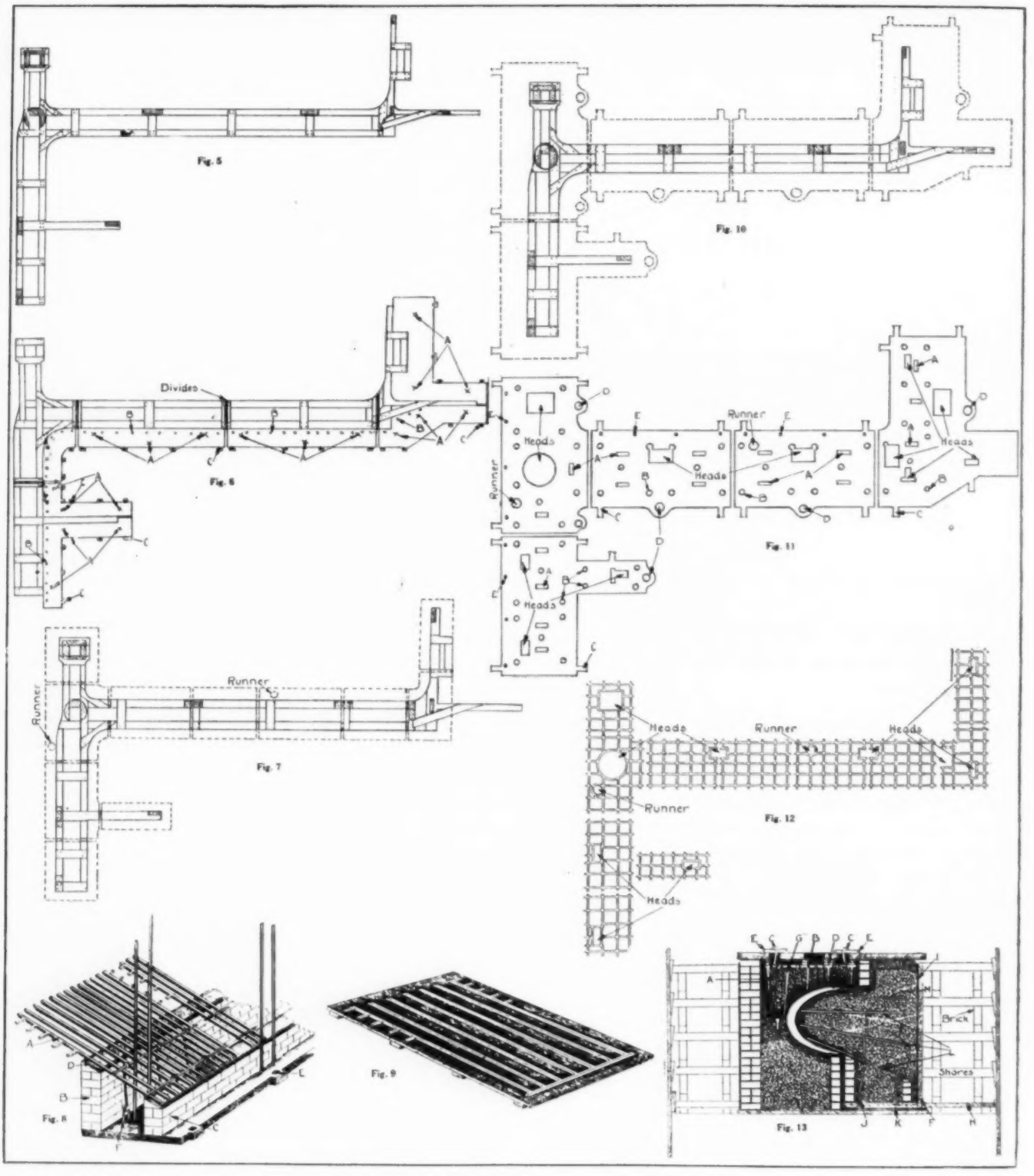


FIG. 5—THE TEMPLATE. FIG. 6—LAYING OUT DRAWBACK PLATES. FIG. 7—LAYING OUT BOTTOM PLATES. FIG. 8—DRAWBACK SUPPORTING BARS. FIG. 9—PATTERN FOR BARS. FIG. 10—APPLICATION OF TEMPLATE TO MOLD FOR TOP PLATES. FIG. 11—DETAILS OF TOP PLATES SHOWING POSITION OF VARIOUS OPENINGS. FIG. 12—COPE GRIDS. FIG. 13—SECTION OF THE MOLD SHOWING METHOD OF SUPPORTING SAND IN DRAWBACKS AND COPE

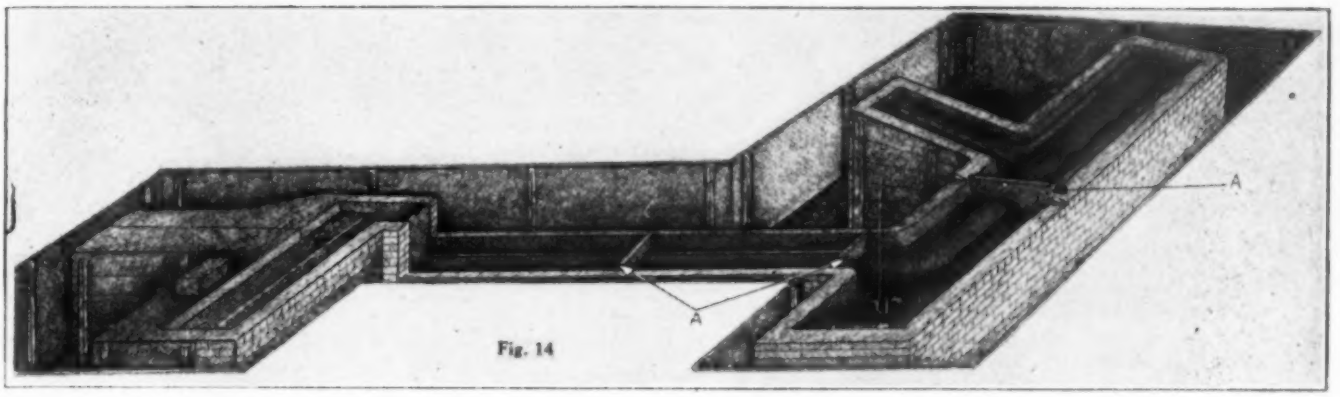
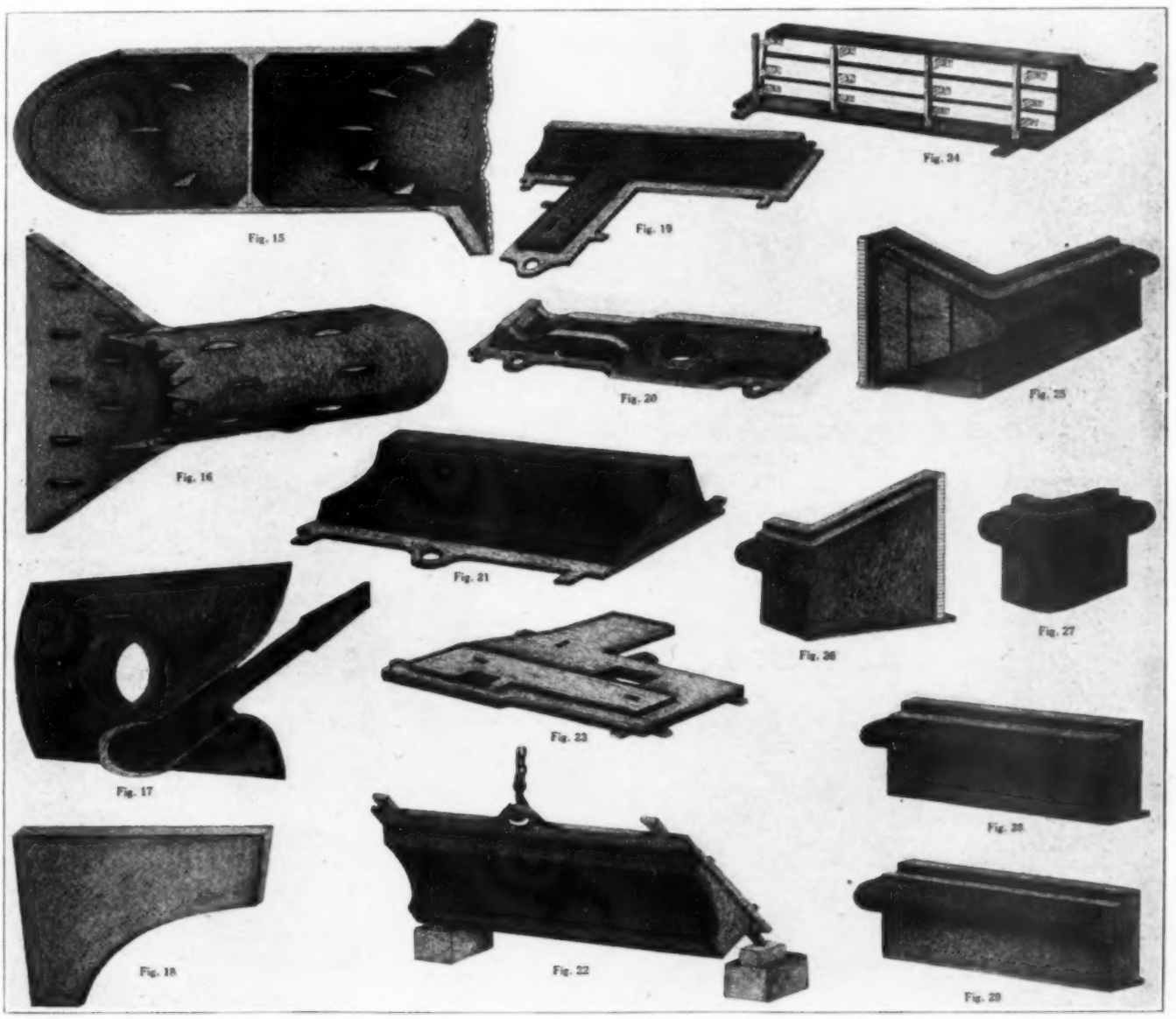


FIG. 14—A SKETCH SHOWING THE METHOD OF DIVIDING THE UPPER PART OF THE MOLD

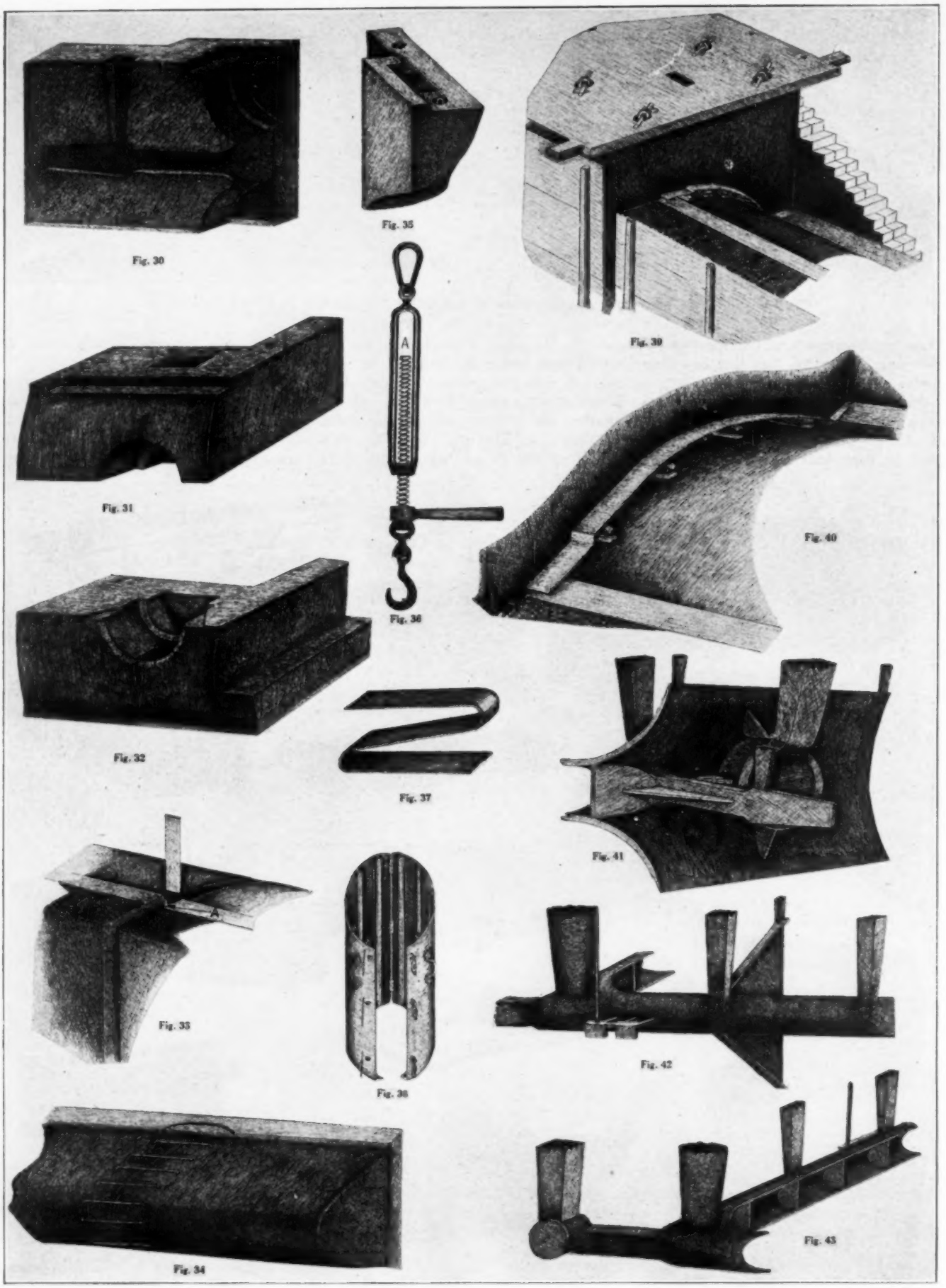
These operations are carried out in the usual way by the use of sling chains etc.

After lifting off the top plates Figs. 19, 20, 21, 22 and 23, it will be found necessary to support the sand in each unit before it is turned over for finishing. Small bars are inserted and wedged securely in the holes *E* Fig. 11 previously mentioned. Lengths of timber then are placed against the large part of the joint as shown at Fig. 24, and after this is completed the top plates are turned over by the arrangement *D* Fig. 11.

The top half of the pattern now is removed and the drawback sections, Figs. 25, 26, 27, 28, 29, 30, 31, 32, 35 are withdrawn in their respective order by beam slings and the screw



FIGS. 15, 16 AND 17 ILLUSTRATE METHOD OF BRACKETING THE PATTERN TO PREVENT FRACTURE OF THE CASTING. FIG. 18—THE DIVIDING BOARDS. FIGS. 19, 20, 21, 22, 23 AND 24 SHOW HOW TOP PARTS ARE ROLLED OVER AND SUPPORTED. FIGS. 25, 26, 27, 28 AND 29 ARE SECTIONS OF DRAWBACKS



FIGS. 30, 31, 32 AND 35—LOOSE PARTS OF MOLD AROUND SHAFT BRACKET. FIG. 33—THE DIVIDES. FIG. 34—STEEL RODS SUPPLANT THE BRACKETS. FIG. 36—TYPE OF SCREW HOOK BY WHICH THE LOAD MAY BE BALANCED NICELY. FIG. 37—ONE OF THE SPRING CHAPLETS. FIG. 38—THE HEAD CASING IS HINGED. FIGS. 39 AND 40—STEEL BAND SPRINGERS CLOSE THE OPENING UNDER THE DIVIDING SPACE. FIGS. 41, 42 AND 43 SHOW DISTRIBUTION OF RUNNERS AND SHRINK HEADS

hook or turnbuckle arrangement shown in Fig. 36. These screw hooks enable the operator to balance the drawback perfectly. During the adjustment extra purchase may be applied if necessary by the insertion of a tommy bar in the space above the screw at *A*.

After removing the drawback, the loam bed is protected by a covering of anything suitable for the molders to stand on during the finishing of the bottom portions, otherwise the bed would be filled with footprints and destroyed during this operation. This also would cause trouble during the reassembling of the mold after it was dried.

Mold Is Dried

When finishing the bottom part, the runners are cut as shown at *D* Fig. 4, after which all of the various portions are finished in the usual way.

The portable sections of the mold are placed in the drying stoves, and the bottom portion enclosed and sealed by placing a suitable covering over it. This portion then is dried by the application at various points of vantage of a patent portable heating apparatus.

The mold must be assembled carefully to prevent the loss of the casting. Before replacing the drawbacks, it is advisable to examine the loam bed and remove any small projections that may have lagged there during the drying process. Wads of soft clay then are placed in various positions about the bottom part immediately below the projection of the drawback, to ascertain the metal thickness. If correct, the drawbacks are located permanently and held securely in position by the bars *H* Fig. 13. These bars will prevent any movement of the drawback during the locating of the top portions. The division spaces between the drawbacks then are made up by first inserting a piece of thin steel plate, free from rust, behind the web positions at the divides as shown at *H* Fig. 33. The space then is rammed full of good bonded sand.

Gaps Are Filled

A chilling effect also is given at the web positions by the steel dogging arrangement as shown in Fig. 34. This helps the brackets to prevent fractures at these places. The top parts now are turned back again and replaced in their original order and positions. After locating the part shown in Fig. 19, a piece of sheet steel bent to the contour of the mold at this position is inserted partly under the top part at the divide as shown at Figs. 39 and 40, and is so placed that the adjoining edge of the part shown in Fig. 20 will sit on it. These pieces of sheet steel are held in their correct positions with the springers Fig. 37.

After locating the part shown in Fig. 20 the space between the top parts above the springers is made up by first placing a layer of cotton waste or other material on the sheet steel and then carefully ramming strong sand into the remainder of the space.

After all the divides are made secure, the runners are placed in position as shown at *A* Fig. 1. Any extra head allowance necessary is added by the casings shown in Fig. 38. These casings are made on the snap flask principle, so that they can be removed easily during the easing process, and are rammed up to the required size as shown at *B* Fig. 1. All that now remains to make the mold ready for pouring is to secure the outside. This is done by placing suitable plates against the brickwork, etc., and then shoring them up with lengths of timber and wedges as shown at the cross section illustrations Figs. 13 and 44. The whole also is clamped together as shown at *C* Fig. 1. Large weights *D* are placed wherever possible on the top plates, particularly over the division spaces, thus making all these places secure.

Following a careful examination to see that everything is satisfactory, the mold is declared ready for the metal. After the pouring operation has been carried out successfully, the steel is allowed to solidify and then easing operations are commenced.

The runner and attendant tackle are removed first, then the weights etc. are lifted off. The head casings are loosened and the toggles displaced, preparatory to the removal of the top plates. The sand at the base of the heads is loosened with sharp pointed chisel bars, to provide a clearance when lifting off the top plates. The shores, etc., are removed from the pit to ensure freedom of action during the withdrawal of the drawback plates. Before removing these, the bars *F* Fig. 13 are taken away.

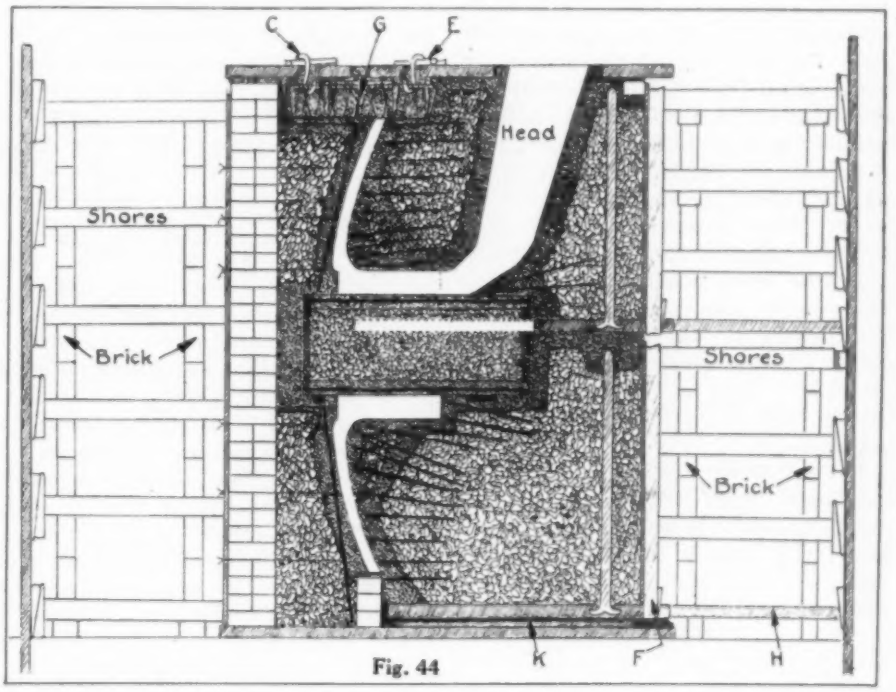


FIG. 44—SECTIONAL VIEW OF MOLD AT SHAFT BRACKET

This causes the plates at the back of the drawbacks to collapse, thus making the way clear for the release of the *S*-hook *J*. The sand, etc., then is dug away and the straight cast irons *A* Fig. 8 and *L* Fig. 13 are broken, after which the casting is allowed to cool completely, before its removal from the pit.

Will Sell Tumbling Mills

F. Butler, formerly associated with the Bock Bearing Co., Toledo, O., has joined the sales force of the Royersford Foundry & Machine Co., Royersford, Pa., and will cover Illinois, Iowa, Wisconsin, Minnesota and territory adjacent to Chicago, where he will make his headquarters.

F. B. Platt, formerly vice president, J. W. Paxson Co., Philadelphia has severed his connection with that firm.

Steel *Quality* Indicated by Open-Hearth *Slags*

By W. C. Hamilton

MORE than 25 years ago, it was recognized that to make good steel, the chief requirement was to form a good slag. Much has been written in recent years concerning open-hearth slags and opinions differ greatly. At a temperature of 3000 degrees Fahr. reactions take place which have not been identified. A molten active slag is different from the laboratory sample, and we resort to theories. Cause and effect lead us to certain conclusions, and give us our ideas concerning the relation between slag and steel.

In the open-hearth practice there are two distinct processes, the acid and the basic. In the acid practice, sand is the essential factor. Sand or silica, SiO_2 is an acid radical giving the name acid open-hearth process.

In the basic practice, a base is necessary, hence the name basic furnace. Three basic materials commonly are used; namely magnesite, MgCo, dolomite, $CaCO_3MgCO_3$, and lime stone $CaCo_3$.

Acids and bases have opposite characteristics and unite readily to form combinations which have entirely new properties. Therefore, it is difficult to discuss both acid and basic open-hearth slags as one subject.

We should think of any open-hearth slag in relation to:

1. The bottom of the furnace.
2. The bath of metal.
3. The flame in the furnace.
4. The deoxidizers and additions.
5. The steel in the ladle.

Acid practice is less complex and should be considered first.

Protection is a chief function of an acid slag. The acid process is essentially an oxidizing one, but it is not a purifying process as is the basic. The bottom of the acid furnace is made up of sand made dense by the addition of slag. The composition of the bath is governed largely by the materials charged and the influence of the flame.

Ordinarily the charge consists of cold pig and scrap. Iron ore, Fe_2O_3, is used as needed. Slag and sand are charged according to conditions. Oxidation is necessary to eliminate the carbon, manganese and silicon. These elements together with iron, act as reducing agents under certain conditions. It is possible to have oxidation or reduction in progress in the bath and the metalloids may exist as a metal or as an oxide.

Knowing the composition of the initial charge and of the bath at frequent intervals, it is easy to check the progress of oxidation. The oxide of carbon escapes as a gas. The oxides of manganese, silicon and iron form a slag. We know that an acid slag is essentially a silicate of iron and manganese, MnO FeO $(SiO_3)_2$. There seems to be no reason to question the assumption that, in an acid slag the iron and manganese oxides exist as bases either free or in combination with silica.

Study Is Important

STUDY of open-hearth slags is of the greatest importance to steel manufacturers, since the relations between slags and metal are extremely intimate. Little is known about slags from a chemical or microscopic viewpoint. Authorities differ greatly when discussing the subject and much work is necessary to give steel men the qualities of slags having a direct bearing on the steel produced. The author, who is general chief chemist, American Steel Foundries, East Chicago, Ind., discusses the various slags and their properties. This article is abstracted from a paper presented at the American Foundrymen's convention held in Detroit from Sept. 27 to Oct. 1, 1926.

Form of Iron Oxide Doubtful

There is a doubt as to what oxide of irons exists, whether it is FeO, Fe_3O_4 or Fe_2O_3, or rather varying combinations of these oxides. It is true that metallic iron also may exist in the slag. An acid slag consists approximately of 50 per cent silica and 45 per cent of iron and manganese oxides, together with other impurities, depending on the composition of the bottom material and the metals charged. The supply of silicon from the metals is limited and the metallic oxides or bases formed by oxidation demand more silica than is available from the silicon in the charge, acquiring it from the bottom or from additions of sand.

An excessive oxidation of iron demands an increasing amount of silica. An equilibrium in the composition is maintained closely so far as bases and acids are concerned. Proper addition of sand will, therefore, prevent silica being absorbed from the bottom. If the bottom is being robbed of silica, damage is done and there is a probability that part of the silica taken from the bottom will be trapped in the bath of metal. Thus we may obtain our inclusions in the metal with their evil effects on the steel produced.

As previously noted, slag is added to the bottom of a new furnace to make it more dense. Unless this practice is followed, considerable molten metal from the first heat will penetrate into the bottom. This iron is oxidized gradually and later will react with the carbon in the bath. This reaction gives a boil. Every melter dreads such a boil as it is a warning of a dangerous condition. In extreme cases this boil may work a hole in the bottom and the loss of an entire heat from this cause is not a rare occurrence. At best, a boil of this kind will work impurities upward, which later may be the inclusions which cause a failure of the product. Therefore an acid slag is needed as a protection to the bottom. This protection to the bottom in turn protects the metal.

When the flame strikes the cold charge, the first action is oxidation. Soon pools of metal begin to form. If about 20 pounds of slag per ton of charge has been added, a protection for these pools of iron is formed promptly. In addition, good supervision may suggest the use of sand to protect any bare metal in the early stages of melting. This protection is against oxidation and

the absorption of sulphur from the flame. When the bath is melted completely, a slag covering is formed. As above, this slag is essentially a silicate of iron and manganese. Unless the silicon content of the charge was abnormally high, there is little of this element in the molten bath. The silicon is oxidized in the melting down process and goes into the slag formation. The same is true as regards the greater part of the manganese.

Iron oxide will be released and be thrown back into the bath of metal. Unless reduced, this iron oxide would be carried with the metal as inclusions into the finished products. Therefore it would be possible to have a light colored slag, but with a badly conditioned bath of metal. Unless this process of substitution is followed with extreme care, a poor quality of steel may be produced. Often a melter will add limestone to a slag to thin it. If the slag is viscous, due to a high silica content, such an action is logical. However, the ordinary viscous slag is found not to be thick on account of composition, but due to physical conditions resulting from some previous error of judgment.

Acid Furnace Slag

Limestone added to correct this error will not thin the slag permanently. As the iron oxide is eliminated from the slag, the temporary fluidity is lost. It would seem that it is better practice for the ordinary heat to be made without the use of limestone or other substitute bases. Then the melter would depend on the proper control of his flame to obtain the light color in the slag. A special practice is to reduce silica, SiO_2, from the hearth and transfer it as silicon, Si, to the bath of metal. Slag high in silica is necessary to accomplish this result, and it is good practice to use limestone to make such a slag more fluid. No substitution takes place as an abnormal condition exists and the lime added will unite with the excess silica.

Slag in an acid furnace is the natural product of the process. However, modifications of it are made easily. While the slag is a protection to the bath, it must also act as an agent, transmitting the oxidizing action of the flame to the bath of metal. Attempts have been made to eliminate phosphorus or sulphur by the acid practice, but so far nothing of practical value has been developed. Open-hearth slags present difficulties when certain additions are to be made to the steel in the furnace. Every one knows the great loss when chromium or manganese are added to the steel through the slag. However, this loss can be reduced materially when the slag has been conditioned properly. Our efforts to improve the quality of the metal will reduce the loss of the additions. When the steel is tapped into the ladle a covering of slag is necessary to conserve the heat in the steel.

In the basic open-hearth practice the slag is of even greater importance, as through it large amounts of phosphorus and also sulphur to a less degree are eliminated. As sand, SiO_2, is the essential factor in the acid process, so are the oxides of magnesium, MgO, and calcium, CaO, in the basic. The basic bottom is built up with burnt magnesite or burnt dolomite. Slag is again necessary to obtain a dense bottom. Lime or limestone is charged in a definite proportion to the charge. From a metallurgical standpoint limestone $CaCO_3$, is preferable to lime, CaO, as a flux. However, from an economical view lime has certain advantages.

Table I

Analyses of Slags

	Heat No. 1 16 2/3 per cent limestone per cent	Heat No. 2 4.3 per cent lime 7.8 per cent limestone per cent
SiO_2	11.00	13.58
FeO	22.90	22.25
MnO	6.46	10.97
CaO	48.87	42.92
MgO	6.75	5.42
P_2O_5	3.85	1.30
S	0.20	0.16
Al_2O_3	.....	3.91
	100.03	100.55

Limestone is a raw material and its composition is certain. Lime, in being calcined, is contaminated with sulphur from the fuel. Also the lime may not be calcined prefectly and therefore contain varying amounts of carbon dioxide. When stored in the open, limestone is improved, as it disintegrates more easily when charged into the furnace. Lime must be protected from the weather, otherwise it will absorb moisture and carbon dioxide and give a disintegrated product of an unknown composition.

Limestone, when charged, must be calcined. That operation requires heat and time in the open-hearth furnace. However, this calcining or elimination of carbon dioxide creates a desirable action in the bath of metal. It has been stated that this ebullition of carbon dioxide aids in the elimination of sulphur. However, it would appear, that this effect is apparent, but not real. Limestone free of sulphur naturally would give a lower sulphur bath than when lime is charged together with its contained sulphur.

The output of a basic open-hearth furnace can be increased about 20 per cent when lime is substituted for limestone. The volume of a slag desirable in a basic furnace is an open question. Amounts varying from 8 to 17 per cent of limestone are considered good practice, depending on requirements and composition of the charge. The lower amounts result in reduction of time and in increased yields. Chemical analyses of basic slags, formed by different charges of flux, do not vary greatly so far as the dominating constituents are concerned. The greater use of limestone will, of course, result in the better elimination of phosphorus and sulphur.

Effect of Material on Slag

An interesting comparison is given in Table I, which shows the effect of different amounts of limestone or lime on the composition of the slag and also on the melting loss in the furnace. Charges for these two heats were radically different, which fact accounts for certain variations in the composition of the two slags. However, there is practically no difference in the content of iron oxide. The following data on melting losses is of interest from an economical standpoint: Heat No. 1 with 16 2/3 per cent limestone had a charge containing 52 per cent pig iron. Heat No. 2 with 4.3 per cent lime had a charge containing 20 per cent pig iron.

Knowing the composition of the charge and by analyzing the residual in the bath, it is easy to determine the metalloids lost in the process. The metalloids lost in these two heats were: Heat No. 1, 5.8 per cent. Heat No. 2, 3.3 per cent.

In addition to the metalloids, we must know how much iron is lost in the process. It is assumed that all of the magnesia in the slag comes from the burnt dolomite used in making up the bottom. Knowing the content of lime and magnesia in this dolomite, it is a matter of proportion to convert the magnesia content of the slag into the amount of lime in the slag which had come from the dolomite.

Theoretical figures of Table II on melting loss have been substantiated by actual weights. Data

in Table II indicate the savings that can be made by a study of the materials charged into a basic open-hearth furnace including the fluxes. Both of these practices are common ones and show a difference of 4.3 per cent in the melting losses. However, it should be noted, that coke is used in the No. 2 charge, and it is not included in the metals charged. It has been shown that a low fluxing charge will increase the yield and a reduction in time is also effected.

Table II

Analysis of Dolomite To Make Bottoms

	Per cent Lime (CaO)	Per cent Magnesia (MgO)
Heat No. 1	56	40
Heat No. 2	50	30

Heat No. 1—6.75 per cent magnesia $\times \frac{56}{40}$ = 9.45 per cent lime from bottom.

Heat No. 2—5.43 per cent magnesia $\times \frac{50}{30}$ = 9.05 per cent lime from bottom.

	Heat No. 1	Heat No. 2
Lime in slag, CaO	48.87 per cent	42.99 per cent
Lime from bottom	9.45 per cent	9.05 per cent
Lime from charge	39.42 per cent	33.94 per cent
Lime, CaO, charged	4,666 pounds	2,180 pounds
100 per cent or weight of slag	11,827 pounds	6,423 pounds
Iron oxide as FeO	39.42 per cent or 2,710 pounds	22.28 per cent or 1,431 pounds
Iron in slag	2,100 pounds	1,109 pounds
Total metals charged, cold	53,520 pounds	52,090 pounds
Iron in slag	3.9 per cent	2.1 per cent
Metalloids lost	5.8 per cent	3.3 per cent
Iron in slag	9.7 per cent	2.1 per cent
Melting loss	3.9 per cent	5.4 per cent

Amount of lime necessary will depend to a great extent on the amount of impurities in the charge. Sand adhering to castings charged will require extra lime. A well-established practice is to add burnt lime during the refining period as it is needed to condition the slag.

Iron oxide in the basic slag, as in the acid slag, is the factor having the great influence on the quality of the steel. On account of other strong bases present, it is assumed that iron and manganese oxides in the basic slags may exist as either bases or acids. Granting this assumption, a basic slag may have its character changed at frequent intervals. Unfortunately, the color of the cold basic slag is always dark and gives no indication of the character of the slag. The basic melter must depend upon his skill in judging the slag as it exists in a molten state. Ordinarily, he is governed mostly by the consistency of the slag. Lime always will make the slag thicker. Iron ore promotes fluidity, but its addition is limited by the carbon content of the bath and its temperature.

Use of fluorspar (calcium fluoride) to confer fluidity to a basic slag is a common practice. It is well known that an addition of 50 pounds of fluorspar to a basic slag weighing 10,000 pounds will have a marked influence on the fluidity of the slag. What reaction takes place has been considered by the writer for many years and some time ago a catalytic theory was advanced. This theory is illustrated best by the following equations:

$$3\ SiO_2 + 2\ CaF_2 \overset{(1)}{=} SiF_4 + 2\ CaSiO_3$$

$$3\ CaO + SiF_4 \overset{(2)}{=} 2\ CaF_2 + CaSiO_3$$

In reaction No. 1, the fluorspar reacts with silica giving calcium silicate and silicon fluoride, a gas. A part of the silicon fluoride gas no doubt will escape. However, it is assumed that the greater part of it will react with lime as shown in equation No. 2. This reaction gives more calcium silicate and produces calcium fluoride, which would again take part in reaction No. 1, thus completing a cycle. We have formed calcium silicate, a fusible slag and the fluorspar is simply an agent to produce this slag. Such an action would account for the small amount of fluorspar which is necessary to change the consistency of a large mass of slag in the stage of formation.

While the basic reactions are quite different from the acid, nevertheless in both we have a process of oxidation. The problem in either case is to oxidize the metalloids without having an excessive oxidation of the iron. A slag in both processes is a necessity. It has its useful properties and its condition is reflected in the quality of the steel produced. A combination of slag and steel in the finished product is fatal. Fortunately slag is much lighter than iron and there is a natural separation of the two materials in a molten condition. However, too often small globules of slag are trapped in the molten metal.

One of the great problems in the steel industry is to produce a product free of inclusions and these inclusions are to a great extent, particles of slag. Steelmakers today realize the importance of slag in relation to the production of good steel.

A great field of investigation is open to technical men to give to steel manufacturers more definite information concerning the slag reactions in open-hearth furnaces.

Book Review

Oxwelder's Manual, 216 pages, cloth, 6 x 9 inches, published by Oxweld Acetylene Co., New York, price $1.00.

This is the ninth edition of the manual of instructions for welding and cutting by the oxy-acetylene process published by the Oxweld company. To bring it up-to-date to include the best modern practice, the book has been rewritten entirely. The manual consists of 25 chapters which deal with the various phases of welding and cutting rolled and cast steel, cast iron, malleable iron and nonferrous metals and alloys. Several chapters are devoted to equipment, construction and operation of blow pipes and regulators, and welding and cutting accessories. The last two chapters in the manual contain precautions and safe practices, and information on shop layouts. Users and those interested in oxy-acetylene welding and cutting will find this book a valuable aid.

Reviews Achievements

A 42-page booklet has been published by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., which describes the outstanding engineering achievements accomplished by the company during 1926. These include the development of large turbine generator units, water wheel generators, synchronous converters, diesel-electric drives for marine purposes, and numerous other electrical equipment.

FOUNDRYMEN Plan Meeting at *Chicago* in June

DIRECTORS of the American Foundrymen's association have announced that the headquarters for the convention of 1927, to be held in Chicago June 6, 7, 8 and 9, will be at the Edgewater Beach hotel. It generally was accepted at the Detroit meeting of the association directors, Sept. 26, 1926, that the 1928 convention should be held in some eastern city, and when the decision was made to return to the practice of holding spring conventions, Chicago was chosen unanimously as the center for the current year.

Tentative convention plans have been announced by C. E. Hoyt, executive secretary of the association, calling for sessions on gating castings, cast iron metallurgy, apprentice training, nonferrous, malleable and steel founding, sand control, foundry costs and general foundry practice. A special feature of the spring convention will be the holding of breakfast gatherings for the nonferrous, gray iron, steel and malleable groups. It is being planned to make these meetings of special interest to foundrymen, executives, engineers, metallurgists and the practical shopmen.

Arrangements rapidly are being completed for entertaining the foundrymen who will attend the convention, the Edgewater Beach hotel being appointed admirably for such a gathering. Special room rates have been provided for those attending, the same rates being offered by other nearby hotels such as the Sovereign, the Sheridan Plaza, the Copeland and the Admiral. Special reduced transportation rates to the convention city also have been provided, including a time limit from June 2-16, affording ample opportunity for stopovers before and after the convention proper. Plant visitations programs, although as yet unannounced, also will be provided for delegates.

The tentative schedule of meetings as at present contemplated for the convention includes the following:

Monday, June 6

Registration and committee meetings.

Tuesday, June 7

Apprentice training.
General foundry practice.
Gating castings.

Wednesday, June 8

Nonferrous founding.
Cast iron metallurgy.
Steel founding
Malleable iron.

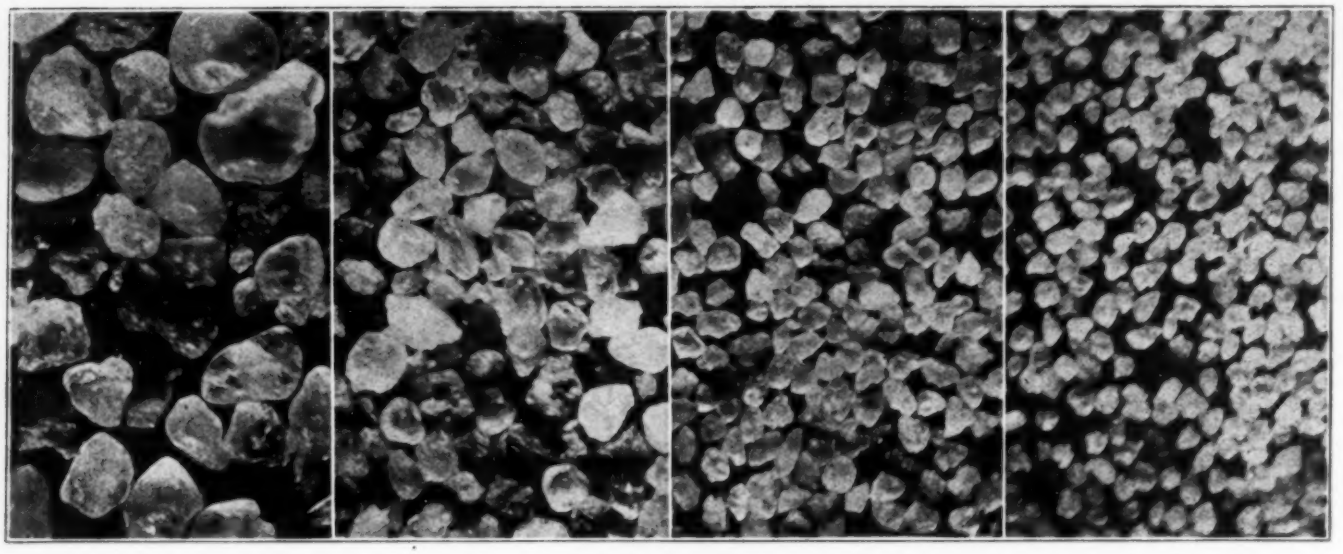
Thursday, June 9

Foundry costs.
Sand control.

Coincident with announcement of convention headquarters comes the official statement that membership records for the American Foundrymen's association have been broken, the membership on Dec. 31, 1926, totaling 2176. During the past year 501 new members were added to the rolls, while 79 were dropped either through resignation or death, showing a net gain of 422.

Today there are more than 200 firms or corporations with two or more individual memberships in the association. The leading five companies in this respect, with listed memberships, are as follows: Ohio Brass Co., Mansfield, O., 19; Detroit Steel Casting Co., Detroit, 18; Ajax Metal Co., Philadelphia, 14; Walworth Co., Kewanee, Ill., 12, and General Electric Co., West Lynn, Mass., 11.

According to the records of the association, the members operate 1066 gray iron, 608 nonferrous, 220 steel and 148 malleable foundries or departments. Many of the firms operate two or more classes of foundries. The consistent growth of the association during the past year is shown in the following record of new members elected each month: January, 98; February, 62; March, 51; April, 22; May, 22; June, 6; July, 42; August, 25; September, 81; October, 61; November, 13; December, 18.



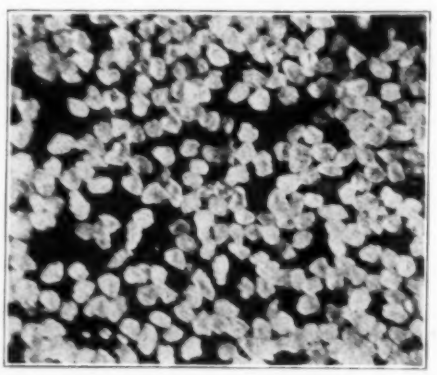
Describes Testing Methods

Accuracy and Time Saving Are Claimed for a Recent German Process of Determining the Degree of Fineness and the Amount of Clay in Molding Sand Samples

By P. Aulich, Duisburg, Germany

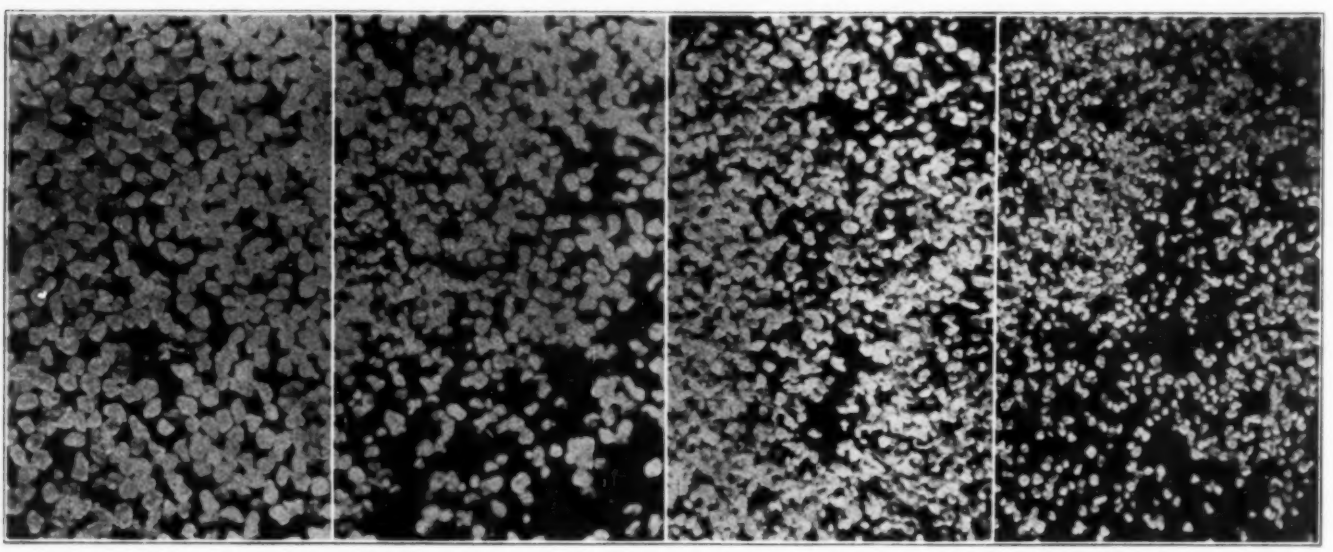
DESCRIPTION of methods developed by the American Foundrymen's association admirably show how to test molding sand for grain size and clay content. The only objection that can be advanced against the method is that it is comparatively slow.

Sieves made of wire or perforated tin easily are stopped, especially with sand made up of angular grains. Silk gauze sieves similar to those used in flour mills present a perfectly smooth



surface and do not ravel out. The meshes are uniform in size on account of the threads being knotted regularly. The sieves readily may be sub-divided into any required number of sizes. For the experiments described in this article, eight different sizes were employed to avoid grading the sand into too many classes. The result of the first grading is shown in Table I.

Both cold and boiling water were employed in these determinations. It



READING THE ENTIRE SET OF MICROGRAPHS IN THE USUAL MANNER FROM LEFT TO RIGHT SHOWS THE EFFECT OF PASSING A SAMPLE OF MEDIUM SIZE GRAIN MOLDING SAND THROUGH A SET OF EIGHT SIEVES. THE SAND GRAINS IN THE FIRST ARE APPROXIMATELY 0.4-MILLIMETER, WHILE THE GRAINS IN THE LAST DOWN AT THE RIGHT CORNER ARE ONLY 0.05-MILLIMETER

was found that cold water is not a satisfactory agent in separating the sand grains from their clay envelopes. Under the microscope, part of the clay film still could be noted. Even repeated treatment by cold water will not remove the clay completely from the rough surface of some sand grains. Boiling the molding sand in water effects a complete separation between the sand and the clay. The clay may be poured off with the water, leaving the clean grains of sand behind. By repeating the process the water becomes quite clear. Frequently a certain quantity of silt remains over the sand. This can be removed by a few short boiling operations.

Difference in results after treating with hot and cold water is shown in Table II. The sand is from the well-known sand pit of Bottrop, Westphalia with a clay content about half way between minimum and maximum.

In comparing the respective sieve quantities, the difference between the hot water and the cold water method easily is perceived. The coarser parts of sand a, b, c, etc., under the cold water method are greater than those shown under the hot water method. This is accounted for by the film of clay referred to previously which surrounds the grains and makes them appear larger than they really are. Under the microscope the quartz grains of boiled sand are clear and transparent. The other sand is more or less opaque and differs in color to the clean sand which has been purified by boiling in water.

Detail of Method

Sand is tested in the following manner: The sample is dried at a temperature of 105 degrees Cent., then 10 grams are weighed and placed in a 600 cubic centimeter glass with 250 cubic centimeters of water. Greater quantities prolong the time without resulting in greater accuracy of final result. The sand and water are boiled for 15 minutes, after which the mass is whirled up rapidly by a sharp stream of cold water from the tap. The sand grains separate from the water and sink to the bottom while the clay remains suspended. The water containing the clay is poured off into a vessel of 5 liters capacity. The process is repeated until the water becomes perfectly clear.

The clean sand then is placed on a filter and dried in an oven until the constancy of weight is attained. Then it is removed from the filter and weighed. This shows the percentage of sand. The difference be-

(*Concluded on Page* 107)

Table I

Classification of Sand According to Grain Size

No. of commercial silk gauze	Measured grain size in m. m. remaining in the sieve	Size of meshes measured microscopically in m. m.
1 a	larger than 0.4	0.5
4 b	0.32 to 0.39	0.3
8 c	0.20 to 0.30	0.2
10 d	0.15 to 0.20	0.15
12 e	0.126 to 0.149	0.12
16 f	0.09 to 0.115	0.08
20 g	0.063 to 0.08	0.06
25 h	0.05 to 0.06	0.05
through i	smaller than 0.05	

Table II

Comparison of Samples Treated with Cold and Boiling Water

Sand grains retained by sieve number		Treated 10 times with cold water, per cent	Treated with boiling water, per cent
	Sand content:	92	84.3
	Clay	8.0	15.7
4	b	5.4	2.6
1	a	2.2	1.3
8	c	28.4	16.4
10	d	42.7	45.9
12	e	5.2	7.5
16	f	4.3	5.9
20	g	0.6	0.8
25	h	1.1	1.5
through	i	1.4	1.8
Weighing loss		0.7	0.6
		92.0	84.3

Table III

Proposed Classification of Sieve Sizes

Sieve number		Grain size m. m.	American bureau of standards sieves
4	a	larger than 0.3	.....
8	b	0.2 to 0.3	70
16	c	0.09 to 0.2	140
25	d	0.05 to 0.09	about 200
through	e	smaller than 0.05	270

Table IV

Sand and Clay Content Compared with Grain Size

Sand, per cent	63.1	88.7	92.4	74.9	83.5	93.2	52.0	89.2	92.0
Clay, per cent	36.0	11.3	7.6	25.1	16.5	6.8	48.0	10.8	8.0
Grain sizes, per cent									
a larger than 0.3 m. m.	21.8	38.5	27.4	3.0	2.7	1.5	1.8	0.1	1.2
b from 0.2-0.3 m. m.	9.8	15.6	21.5	11.3	1.2	16.1	1.5	0.5	2.9
c from 0.09-0.2 m. m.	17.2	28.2	39.3	56.0	54.8	70.1	3.0	5.0	25.8
d from 0.05-0.09 m. m.	4.2	3.8	2.6	2.8	15.3	3.6	2.7	24.7	30.1
e smaller than 0.05 m. m.	10.1	2.6	1.6	1.8	9.5	1.9	43.0	58.9	32.0

Table V

Nine Typical Sand Samples Taken from 128 Submitted

Prposed Sand Classes	Grain Sizes in m. m. Per Cent	Per Cent Clay Content
No. 1 coarse grained—high clay content.	above 0.2 m. m.	more than 20
No. 2 coarse grained—middle clay content.	above 0.2 m. m.	from 8 to 20
No. 3 coarse grained—poor clay content.	above 0.2 m. m.	less than 8
No. 4 middle grained—high clay content.	from 0.09-0.2 m. m.	more than 20
No. 5 middle grained—middle clay content.	from 0.09-0.2 m. m.	from 8 to 20
No. 6 middle grained—poor clay content.	from 0.09-0.2 m. m.	less than 8
No. 7 fine grained—high clay content.	smaller than 0.09 m. m.	more than 20
No. 8 fine grained—middle clay content.	smaller than 0.09 m. m.	from 8 to 20
No. 9 fine grained—poor clay content.	smaller than 0.09 m. m.	less than 8

	more than 40
	more than 40
	more than 40

Casts Pipe Centrifugally-II

By E. C. Kreutzberg

ONLY one change has been made in the construction of the deLavaud machines as described in THE FOUNDRY, Sept. 15, 1923, page 727. At that time the rotation of the mold was derived from a Pelton wheel operated by water at high pressure. In the new units at Burlington, the Pelton wheel has been eliminated and the molds are rotated by 230-volt direct-current motors. Water at high pressure continues to be employed in moving the mold longitudinally and in operating the tilting ladle. An improvement has been made in reclaiming the surplus metal after the conclusion of each cast. As was the case previously, the flow from the pouring trough is diverted automatically into a pig mold in the floor at the side of the machine, after the mold has reached its limit of longitudinal travel. From these molds the pigs are dropped the same as before into a subway below the foundry. The improvement is that in the new plant the pigs drop directly into steel cars on wide-gage tracks in the subway. When the cars become filled they are removed into the material yard and their contents emptied. Hence, the handling of overage metal is accomplished with considerably less expenditure for labor than before.

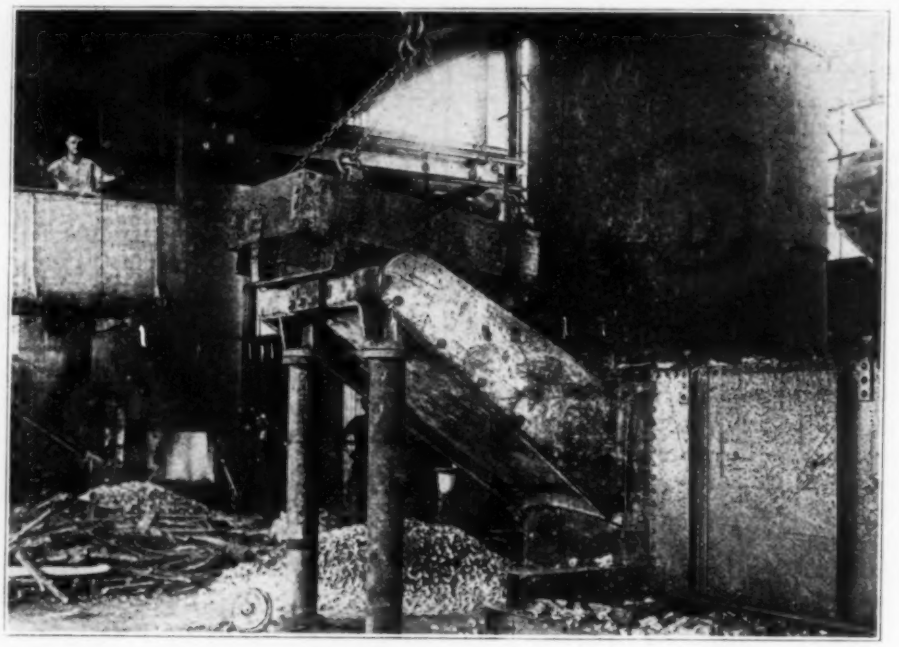


Fig. 7—The Charge Is Dropped From the Skip into the Chute

Inasmuch as the use of water at high pressure for operation and at low pressure for cooling is so important a factor with the deLavaud machines, it was necessary to make the piping accessible so that any leakages or stoppages may be repaired promptly. All piping, therefore, passes through the subway and is exposed.

The rate of production of the centrifugal pipe has been increased considerably. Two years ago at Birmingham, an average of 20 pipe an hour was obtained from each deLavaud unit. At the present time, the production ranges from 24 to 40 pipe an hour depending on the diameter. A crew of four men continues to comprise the working force at each machine. As heretofore, a crew of relief men continues to be maintained owing to the continuous character of the work.

Another modification, which has de-

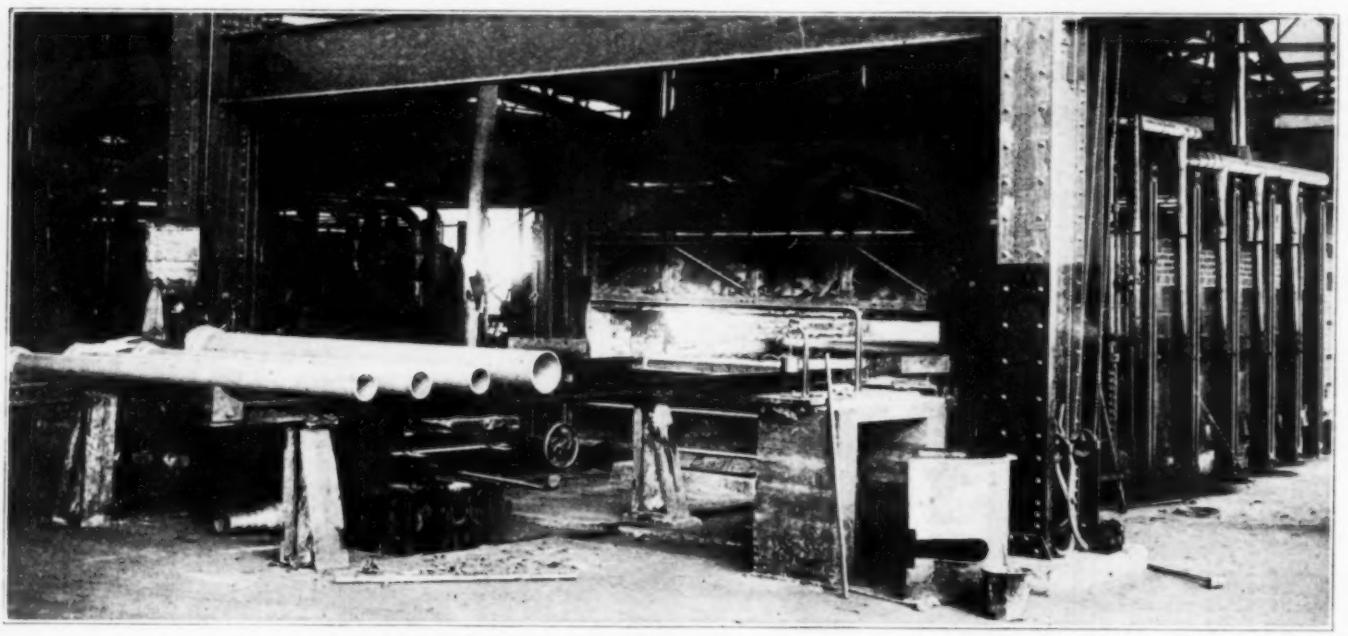


FIG. 6 CHARGING END OF ONE OF THE TWO OIL BURNING CONTINUOUS TYPE ANNEALING FURNACES

veloped, is the elimination of high-silicon iron from the mixture for casting deLavaud pipe. Formerly the company used pig iron averaging 2.50 per cent silicon for casting pipe. It now uses iron of the same analysis as regularly is employed in the production of sand-cast pipe.

Another feature of the progress in the past two years is the amplification of the sizes and weights produced by the centrifugal method. Three years ago the output by the deLavaud process was restricted to 6, 8, 10 and 12-inch pipe, in working pressures of 100, 150 and 250 pounds. Since then the line has been extended to include 4-inch pipe in the same working pressures, and 14, 16, 18 and 20-inch pipe in working pressures of 50, 100, 150 and 200 pounds. As previously stated, the 4, 6, 8, 10 and 12-inch diameters only are produced at Burlington at this time, the equipment for 14, 16, 18 and 20-inch deLavaud pipe having been installed at Birmingham.

A highly efficient plant has been installed for production of the socket cores which form the interiors of the bell ends of the pipe. This department is in the east end of the annealing building. It is equipped with an extensive sand-handling system by which the conditioned sand is delivered to the core benches. Pneumatic rammers are employed by the coremakers and the cores, as produced, are placed on shelves in steel racks, when filled, are lifted by electric storage battery trucks and placed in the drying ovens. Of these there are six, built in a single unit, each oven being 6¼ feet wide, 7 feet high and 16 feet long. The racks are placed in the ovens at one end and removed at the other.

Annealing equipment comprises two oil-burning ovens of the continuous type, identical in construction and operation to those in use in the deLavaud department at Birmingham. These were described in the Sept. 15, 1923 issue of THE FOUNDRY. Scales are located in front of each furnace, as before, for weighing the pipe as they come from the molds, and thus there is an immediate opportunity for increasing or decreasing the flow of the metal. This, as previously stated, is done by accelerating the pouring speed or the longitudinal speed or both. In connection with the annealing furnaces there is a central control house where the recording pyrometers and other apparatus are located to make them easily accessible.

From the annealing ovens, the hot pipe are rolled by gravity down the skids into the cleaning, coating and testing sheds. Breaking out the socket cores with an air hammer is the first operation. Next, the interior of the pipe is smoothed by a motor-driven reamer, and the exterior is cleaned with a wire brush. The pipe required for water lines is dipped while still hot, into vats of tar which are served by 2-ton hoists. They next are subjected to a hydraulic test of 500 pounds per square inch. Each pipe is weighed and is subjected to a scleroscope hardness reading before being shipped.

From the cleaning sheds the pipe are transferred to the pipe yard. Here the sections are classified according to size. The pipe yard is equipped with 33 skids, each 260 feet long, and on these the pipe are held for shipping instructions. A gasoline tractor located on a track at the ends of the cleaning sheds is employed for handling pipe to the skids. Shipment of the pipe is made both by rail and by water. Commanding the ends of the pipe yard skids is an overhead crane which loads the pipe

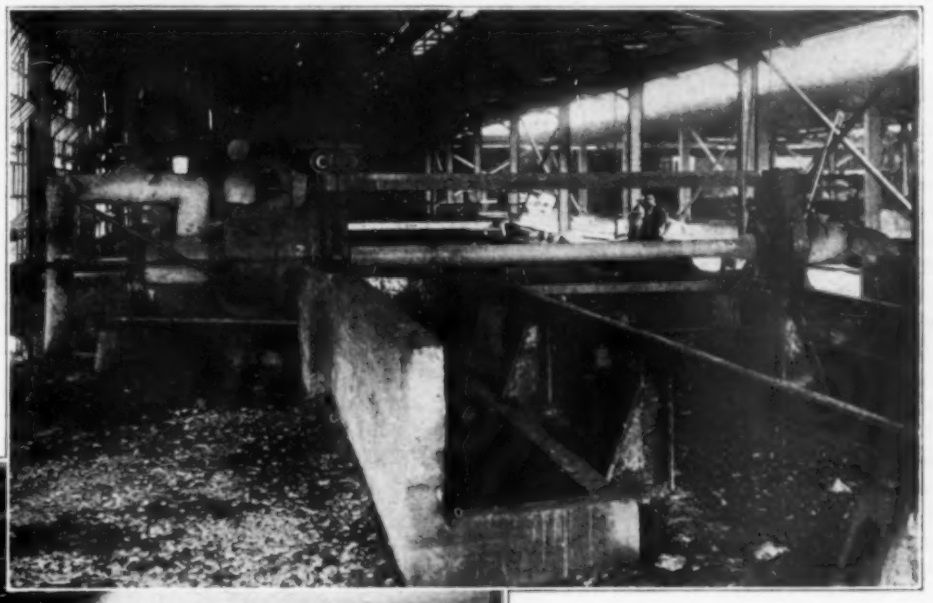


Fig. 8 — (Below) — Scrubbing Machine Euipped with a Wire Brush for Cleaning the Surfaces of the Pipe Before Shipping

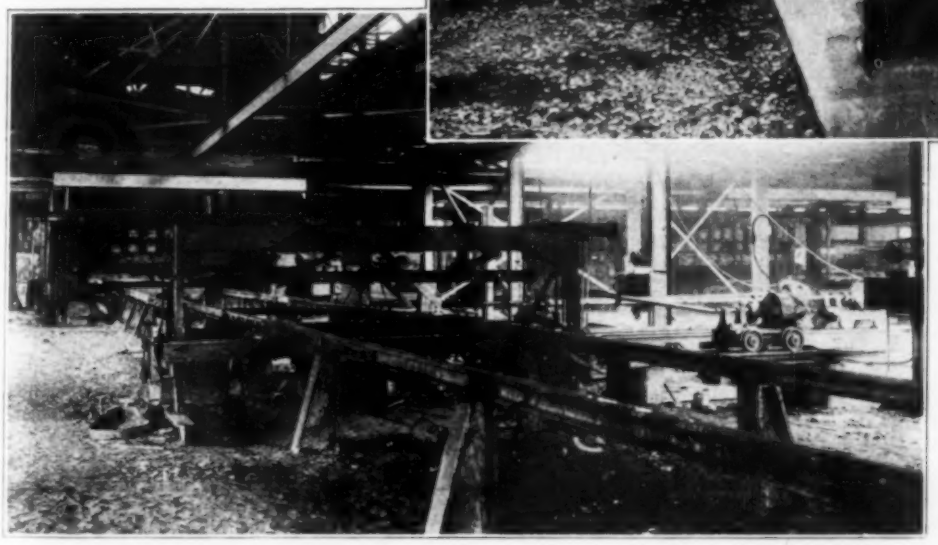


Fig. 9—(Above)—All Pipe Must Pass a Hydraulic Test of 500 Pounds per Square Inch if Intended for Water Lines

into cars. Pipe for shipment by water are transferred to the company's wharf where they are loaded onto barges by the aid of a locomotive crane.

Fuel oil is brought to the plant in tank and oil tank barges and placed in two storage tanks each of which has capacity for 125,000 gallons, making a total capacity of 250,000 gallons. From these tanks the oil flows by gravity to a service storage tank from which it is pumped to the various points of consumption. These include the annealing ovens, core ovens and boilers.

Rotary Converters Employed

In a power house building furnishing all the necessary power to this plant, are two 500-kilowatt rotary converters. These receive alternating current from a public service station at 23,000 volts and step it down to 230-volt direct current. This building is equipped with a steam engine which is held in reserve for generating the company's power requirements in periods of emergency when the outside power supply is interrupted. An 800-cubic foot air compressor supplies air for ramming cores, for blowing dust and dirt out of the deLavaud pouring troughs and molds, for operating air hammers, etc. Water required in the operation and cooling of the deLavaud machines, in the boilers and in the fire protection system, is obtained from the Delaware river. It is pumped into a 75,000-gallon elevated tank by two service pumps each having capacity for 500 gallons per minute. These maintain the water in the elevated tank at a pressure of 40 pounds. Two 900-gallon hydraulic pressure pumps, operating at 140 pounds, provide the supply for operating the deLavaud machines. One 65-gallon hydraulic pressure pump, operating at 500 pounds through an accumulator, furnishes the supply of water for testing the pipe. Both 900 and 65-gallon pumps receive their supply of water from a 48-inch underground intake line from the river. This intake is provided with a 12-foot square, 18-foot deep concrete collection chamber equipped with screens to keep foreign matter from the pumps.

The new plant is provided with numerous accessory departments. One of them is a machine shop for making repairs entailed in the upkeep of the equipment in the deLavaud department. There is a storage room containing a complete stock of parts for deLavaud machines and other apparatus and equipment in this plant. A separate building for cutting pipe to short lengths also is provided. The plant throughout is equipped with the most modern sanitary facilities. A steam system is employed for heating in cold weather. Drinking water is obtained from an artesian well.

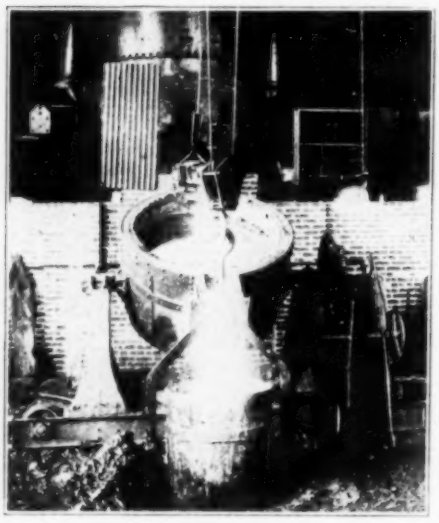


FIG. 10—FILLING ONE OF THE LADLES WITH METAL FROM THE RESERVOIR

To such an extent has the consumption of deLavaud pipe increased, that the United States Cast Iron Pipe & Foundry Co. on June 1, 1926, was able to announce that more than 1,500,000 lengths of pipe made by this method were in use.

Ohio State Foundrymen Dig into Sand Heap

Considerable discussion on the question of sand reclamation developed at a group meeting of the Ohio State Foundrymen's association held in Cleveland on Jan. 10. Edwin S. Carman, secretary and chief engineer of the Osborn Mfg. Co., Cleveland, was the principal speaker and gave an illustrated lecture on sand reclamation. He stated that he believed at the present time too much sand is being wasted on the foundry dump, and the problem of reclamation is to prevent the sand from going to the dump.

Using a number of screen charts Mr. Carman compared the sand analyses of a number of automotive, gray iron, steel and nonferrous foundries in the Cleveland district and showed the variation in fineness, permeability, moisture, cohesiveness and bond for the same types of work. He advocated the use of one sand that could be standardized to meet conditions in making castings from a few pounds in weight up to 600 pounds. Mr. Carman said that he estimated $42,000,000 loss in defective castings was due to sand and that proper supervision and treatment of sand heaps would eliminate most of this loss.

Jens Hansen, assistant manager, Burmeister & Wain, Copenhagen, Denmark, manufacturers of diesel engines, who has been visiting various foundries since the Detroit convention of the American Foundrymen's association in September remarked that production per man in American foundries is considerably higher than on the Continent. He said the European produces 50 castings against the American's 200.

Plant Is Purchased

The Swartwout Co., Cleveland, has completed the purchase of the S. C. Regulator Mfg. Co., Fostoria, O., and the Fostoria plant will be incorporated with the Swartwout plant at Orville, O. The acquisition rounds out the firm's line of steam specialties and power plant equipment.

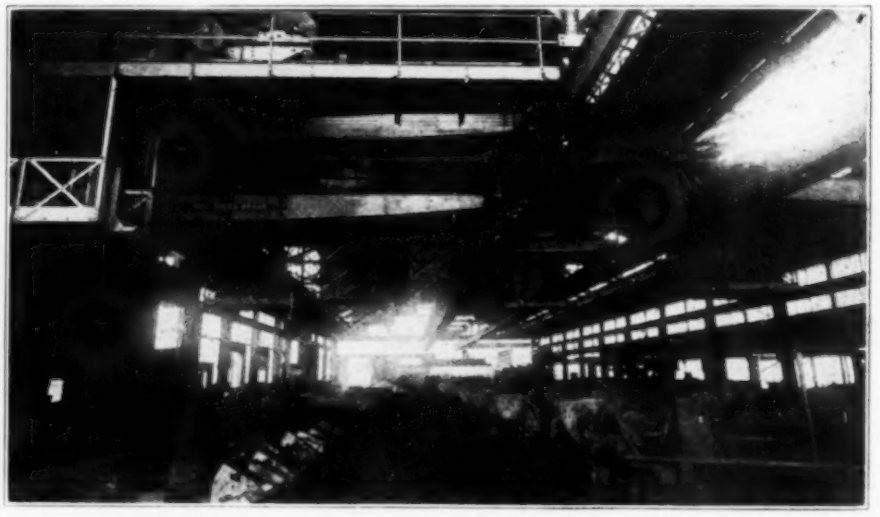
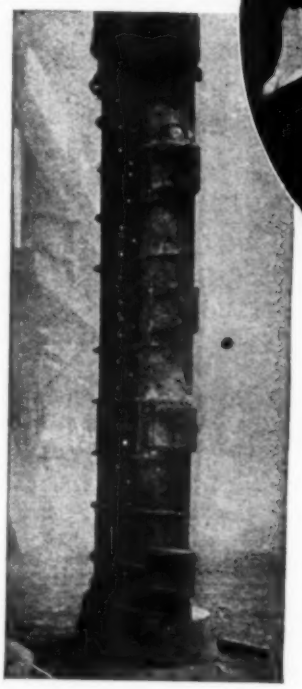


FIG. 11—LOOKING DOWN ON LONG BATTERY OF UNITS. THE CONSTRUCTION OF THE BUILDING PERMITS A LARGE AMOUNT OF UNBROKEN FLOOR SPACE

WELDS FOUNDRY FLASKS *With Bronze*

Fig. 3—Broken Flask for Making Two 8-inch Pipe 14 feet long. The Metal and the Pipe Are Lined Up

Fig. 1 (Below)—Crack 6 Feet Long In This Flask Was Repaired With Bronze for $10.50. Fig. 2 (Right) — Bronze Welding a Break in a Pipe Flask



A GRAY iron foundry will use gray iron castings for all sorts of things, says *Oxy-Acetylene Tips*, not because gray iron is particularly adaptable for the purpose, but because of the impression that it is cheap. Furthermore, once these things are broken, repairs are seldom thought of, unless the machine shop has a slack season. Just melt up the old iron and make a new one, is the usual saying.

This accounts for the difficulty frequently met in overcoming the skepticism of a foundry superintendent when one proposes to repair broken cast iron flasks by bronze welding. However, if the superintendent is open minded, he realizes the waste in remelting a 4-ton casting when it may be repaired for $10, even if he did make the casting himself.

Pipe mold flasks receive notoriously hard usage. In busy times as many as three pourings are made each day. After each one the casting is shaken out, the mold is cleaned by dropping several feet to the hard foundry floor. These flasks open longitudinally, and the hinges carry heavy strains when the craneman hurries them from place to place. On the whole it is surprising that breakage in a big foundry may be kept down to two a day.

For another class of work the flask problem also is acute, at times. This is in the manufacture of thin castings for enameling, such as bath tubs, wash stands, and other sanitary wear. A piece like a bath tub requires flasks with a number of properly placed ribs, to hold the molding sand. It would seem a shame to scrap such an intricate piece because two of the ribs broke away from the walls, yet that is what was done before the advent of bronze-welding. Progressive foundries are now eliminating this item of waste.

Fig. 3 shows a typical crack in a pipe flask. Due to severe stress, a hinge has broken clear away. The first step is to clean a 2-inch strip of surface alongside the crack, either by chipping or grinding, down to good sound iron. Cutting a *Vee* is unnecessary, except where it is undesirable to leave the ridge of bronze above the surface, as where one flask butts against another. If a thick web is to be joined at right angles to the surface, it is desirable to *Vee* the lug so bronze may pene-

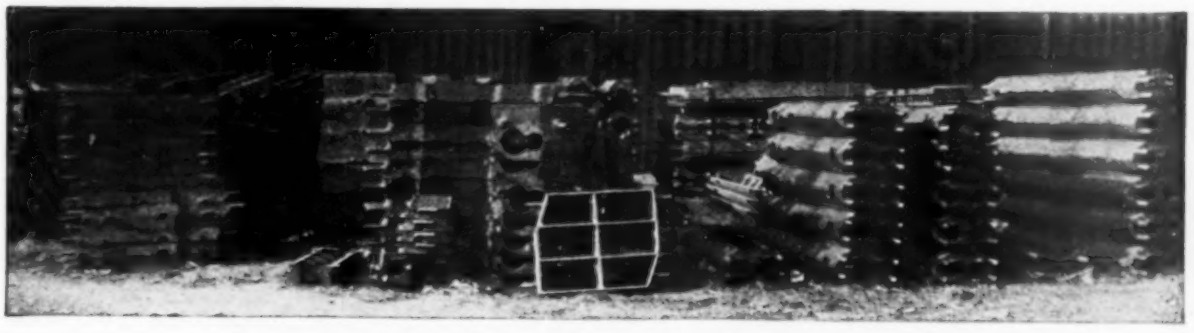


FIG. 4—FLASKS OF VARIOUS SIZES WHICH HAVE BEEN RECLAIMED WITH BRONZE WELDING

trate to the center of the joint. It is necessary to line up such a casting by clamping it in correct position against its mate. If crane service is available, time will be saved if the flask is kept tilted so the seam progresses upward on an incline, the same as when an operator is working at the 45-degree point on a pipe weld. This position allows the operator to control the molten bronze most easily. However, it is by no means essential, as satisfactory bronze-welding may be accomplished readily in any position, even overhead, by a good operator.

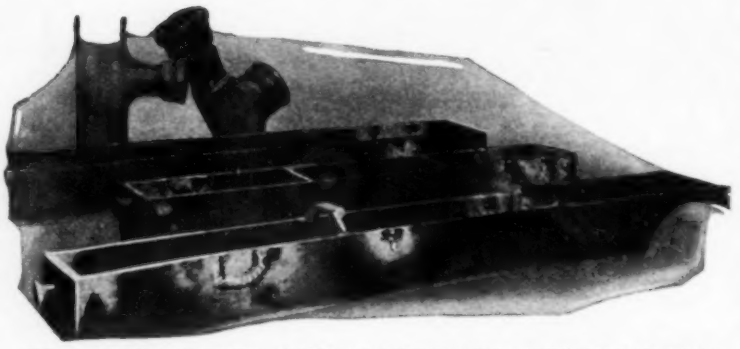


FIG. 5—EIGHT PATCHES MADE IN THREE FIRE HYDRANT FLASKS IN THREE HOURS

Completed, the work appears as in Fig. 1. This flask by the way is 6 feet long, and 1¼ inches thick, including the three hinges in the middle. It seldom will be necessary to bronze weld both inside and outside of such a casting. In fact, this will do more harm than good to thin walls, say less than 1-inch thick. In thicker metal bearing heavy strains, bronze-welding from both sides occasionally may be justified. Often pieces are broken out of flasks and lost. This does not mean that the flask is a total loss. Merely cut a piece of steel plate to fit the hole, and bronze-weld it in position. Fig. 5 shows three badly broken flasks for fire hydrants, each of which have been repaired in several places by this

Uses Bronze To Weld Iron Pipe

WELDING cast iron with bronze is not exactly a new departure. About three years ago, H. Y. Carson, research engineer, the American Cast Iron Pipe Co., Birmingham, Ala., began an investigation on welding cast iron pipe. After experimenting with pipe welded with cast iron rods, he conceived the idea of welding the cast iron pipe with ordinary welding rod made of tobin bronze.

Results of early experiments along this line were discussed in a paper by Mr. Carson which was presented at the Cleveland meeting of the Natural Gas Association of America and abstracted in the June 15, 1924 issue of THE FOUNDRY. *Since that time various phases of the problem of welding cast iron pipe with bronze have been investigated. The old theory that bronze applied to cast iron would set up a difference in electrolytic potential between the cast iron and the bronze has been exploded. Careful study has shown that corrosion does not follow the so-called galvanic action.*

Tests also have been made to determine the strength of the welds. Four lengths of pipe were welded together making a section 60 feet long. The ends of the section were plugged and the pipe was tested with pressures up to 600 pounds per square inch. Later the pipe was tested to the bursting point of about 3500 pounds per square inch. A bending test upon a 60-foot length of bronze welded cast iron pipe deflected it in the middle approximately 15 inches before it broke. The break did not occur through the weld, thus showing that the bronze at the joint was stronger than the cast iron. However, it was found that the pipe broke adjacent to the weld indicating that the bronze was producing some weakness in the cast iron.

After making a large number of tests, Mr. Carson has arrived at the following conclusions:

The width of the tobin bronze weld on cast iron pipe should vary in direct proportion to the thickness of the cast iron pipe, and for a maximum strength the weld should be not less than 1½ times or more than 1¾ times the thickness of the pipe.

The thickness of the tobin bronze weld on cast iron should vary in direct proportion to the thickness of the cast iron pipe and for maximum strength the weld should be not less than 3/16 times or more than ¼ times the thickness of the welded pipe.

The size of the welding flame and the manner of applying the heat must be regulated so as to cause a brazing or tinning of the cast iron surfaces without showing excessive color of heat either in the pipe metal or the welding metal. The most desirable and strongest welds have been produced in pipe where the average time of welding was limited in minutes to less than twice the outside diameter of the pipe. The average peripheral speed of applying the tobin bronze should not approach a figure of less than approximately 2 linear inches per minute.

Bronze welded joint of cast iron pipe grows stronger constantly up to two or three hours after it is completed. Care should be taken to prevent overstrains in the metal, especially during the first short period of time immediately following the completion of the weld. At that time the weld is weak, but has been found to reach maximum strength in five hours.

The results leading to these conclusions are shown in the following table:

PRACTICAL BRONZE WELDING DATA

Nominal Diameter of Pipe Inches	Thickness Class A Pipe Inches	Ideal Width Inches	Ideal Thickness Inches	Ideal Time of Welding Minutes
2 in.	0.25	0.40	0.61	4.0
3 in.	0.39	0.60	0.082	6.5
4 in.	0.42	0.65	0.091	8.0
6 in.	0.44	0.67	0.094	11.0
8 in.	0.46	0.71	0.098	15.0
10 in.	0.50	0.75	0.105	18.0
12 in.	0.54	0.82	0.114	21.0
14 in.	0.57	0.86	0.121	24.0
16 in.	0.60	0.91	0.127	28.5
18 in.	0.64	0.97	0.135	31.0
20 in.	0.67	1.03	0.142	34.0
24 in.	0.76	1.15	0.161	41.0
30 in.	0.88	1.35	0.186	50.0
36 in.	0.99	1.55	0.211	60.0
42 in.	1.10	1.67	0.232	75.0
48 in.	1.26	1.92	0.270	85.0

In a paper before the Gas Producers association, Mr. Carson expressed the belief that this type of welding may be applied to other lines. His conclusions along that line are as follows:

Bronze welding can be used in many ways and it is your problem to develop these applications. For instance, cracks in cast iron can be repaired. Fittings of odd shapes can be produced by bronze welding and all manner of joints in cast iron can be worked out in detail by scientific study of bronze used in the welding process. It is not, of course, our function as pipe makers to work out these problems and we must leave the burden of further development of bronze welding to you.

method of welding the sections with bronze.

Many small flasks in jobbing foundries are scrapped for no other reason than that the holes, by which close alignment is maintained between cope, cheek and drag, become enlarged by constant wear against the registry pins. In some places these holes are enlarged by reaming, and then a cold-rolled or cast iron plug is driven home and finally re-drilled to a matchplate. This is an expensive job, and the bushings have a discouraging habit of loosening. Now holes may be filled with bronze, and redrilled. Bronze resists wear, and there is no tendency for the iron pin to stick when the casting is to be shaken out.

In doing this work one precaution is necessary. If the hole is over ⅜ inches deep, it is difficult to *tin* the bottom of the hole without overheating the metal in the portion so hot it will not form a good bronze weld. A better way is to *tin* the upper part of the hole as deep as may be done satisfactorily, and proceed with the filling without making a real weld to the iron in the lower part of the hole. Experience shows that a bronze bushing made in this way will not loosen.

Cost of bronze-welding is usually low. There is no necessity for preheating the casting, and the seam is made quite rapidly. The cost of preparation and welding, labor and material, for the six-foot crack in Fig. 1, totaled $10.50. The casting weighs 8000 lbs. and cost $125 to make. Two broken flasks are repaired daily, at a saving conservatively estimated at $200. This amounts to a total saving of $60,000 a year in this one pipe foundry.

Costs were kept in another foundry on a bath tub flask which was broken in three places. A weld 8½ feet long was made in metal averaging 1-inch thick, at a total cost in labor and materials of $11.40. Average costs of reclamation on flasks for sanitary ware are stated to be $6, and the flasks cost from $60 to $100 to make. Four are repaired daily. The annual savings from bronze-welding the many different sizes and types of flasks in this plant total $72,000.

Since bronze-welding is done on the surface of the metal, the cost per foot of seam is but little larger for a repair in a 2-inch wall than in 1-inch metal. The above figures indicate that for purposes of estimation, a break a foot long in 1-inch metal can be mended for $1.35, and a weld a foot long on 2-inch metal will cost about $1.75. This is so low as to be negligible in the heavy complex flasks described. It is so low that the jobbing foundry with small flasks also should investigate the possibilities of the method.

Few flasks would have a break longer than one foot, and few of them indeed are valued at as low as $1.35.

Describes Methods

(*Concluded from Page* 101)

tween this and 100 represents the clay content. The amount also may be determined directly from the accumulated sediment in the 5-liter vessel. One result if necessary may be used to check against the other.

The weighed sand is placed in the first gauze sieve *a* stretched over a frame and the sieving action is accomplished by tapping the frame with the finger until no further sand grains fall through. The sieved sand is collected on a black glazed paper. The sand remaining in the sieve is weighed and the amount set down in percentage. The sand which has passed through the first sieve *a* is placed in the second sieve *b* and the process is repeated until the predetermined number of sieves have been employed.

Variation in the size of the sand grains is shown graphically in the series of accompanying micrographs. The dark grains are glauconite, a hydrated ferrous-alkali--silicate. The sizes of the largest and smallest grains were indicated by the ocular micrometer.

Later the number of sieves was reduced to four. This number is sufficient to determine whether the sand is medium, fine or course. Table III is based on this classification. Table IV shows how the foregoing information may be combined to compare the grain size classes with the results showing the sand and clay content. Other characteristics of the same 9 classes of molding sand are shown in Table V. The foregoing 9 classes were selected from 123 different samples of German molding sands tested according to the method described. Duration of the entire test was two hours.

Hold Annual Meeting

Burt Core Sand Co., Detroit, held its annual meeting on Jan. 13. The following officers for the year were elected: Fred A. Cowen, president and general manager; R. J. Mehlman, vice president; W. Edward Thompson, treasurer; John E. Love, secretary. Warner R. Thompson is on the board of directors.

New England Foundrymen Hold Annual Meeting

The annual meeting of the New England Foundrymen's association, held recently at the Exchange club, Boston, was one of the largest gatherings of foundrymen at Boston since the national association met there in 1917. Nearly 200 members from all parts of New England were present. The chief business of the meeting was the election of new officers for 1927. Henry S. Chafee, Builders Iron Foundry, Providence, R. I., was elected president and Charles F. Miller, Universal Winding Co., Providence, was elected vice president. George H. Gibby, Gibby Foundry Co., East Boston, who has been treasurer of the association for 12 years, was re-elected treasurer for 1927, and Fred F. Stockwell, for 31 years secretary of the association, was re-elected secretary. The following executive committee was elected: Carl H. Neumann, Union Mfg. Co., New Britain, Conn., Percy Colvin, J. B. Colvin Foundry Co., Worcester, Mass., Charles Moffet, Whitin Machine Works, Whitinsville, Mass., Ernest F. Stockwell, Barbour-Stockwell Co., Cambridge, Mass., and C. A. Reed, Rogers-Brown & Crocker Bros., Inc., Boston.

Philadelphia Foundrymen See Motion Pictures

Motion pictures showing details of the manufacture of 72-hour foundry coke were shown at the meeting of the Philadelphia Foundrymen's association, Jan. 12. These pictures showed operations at the plants of the Keystone Coke & Coal Co., Westmoreland county, Pa. W. F. Elwood, chemical engineer at the company's mines, accompanied the pictures with a talk.

A new activity has been started by the Philadelphia Foundrymen's association. The members are requested to submit questions for information regarding problems that have given them trouble. Six questions were submitted anonymously at this meeting, but there was no discussion as the questions were not sufficiently specific. In the future the members will present their problems specifically and in person.

New members of the association include the Alan Wood Iron & Steel Co., represented by John W. Logan, secretary of the company, and Robert C. Lea & Co., represented by R. C. Lea. The Reading Car Wheel Co. has been proposed for membership.

How and Why in Brass Founding

By Charles Vickers

Tablets Turn White

We make bronze tablets about 30 *by* 15 *inches and* ¼*-inch thick with raised letters, using an alloy of copper,* 90 *per cent; tin,* 5 *per cent; zinc,* 3 *per cent, and lead,* 2 *per cent. We skin dry the molds and get nice castings which are then polished on the edges and the face of the letters. The background simply is wire brushed as no shellac or acid is allowed to be used on them. After being finished a heavy slab of concrete is cast on the back of the tablet, there being two lugs on the back of the tablet, through which a bar is passed and cast into the concrete. The tablet faced block is used on graves and is laid flush with the surface of the same. The trouble we experience is due to the tablet turning white after being on the grave a short time, but the polished parts do not turn white. One tablet put down a month ago is as white as though whitewashed. What do you think causes this condition?*

We imagine that this phenomenon has a connection with the cement block on the back of the tablet. Possibly, the polishing work done on the edges and lettered parts of the tablet prevents those parts turning white as it causes the surface metal to flow or smear, which would close up invisible pores if present. Also the bright parts may be lacquered and the lacquer protects them. We suggest painting the backs of the tablets with asphaltum varnish which will insulate the bronze from the cement, and if one coat is not sufficient, try two coats, but have them dry before casting the cement.

Bearings Not Lubricated

We have been making hot-mill brasses for a sheet mill, and used an alloy of copper, 82 *per cent; tin,* 10 *per cent; lead,* 8 *per cent. The lot gave good service, but the two additional lots we have made our customers claim have given poor service as they crack due to heating when first put in. After the cracks develop the bearings soon pound to pieces. The rolls are heated to about* 700 *degrees Fahr. Can you give us any reason why these bearings should heat and crack, or is the fault the lack of lubrication?*

We are unable to advance any theory accounting for the first shipment of bearings giving good service, while subsequent shipments gave poor service. There is no reason why such contradictory results should be obtained, even if there was some slight difference in the alloys used, which is not to be thought of in the circumstances. It seems probable the source of the trouble is in the usual place, far removed from the brass foundry, and is at the point where the castings are used. It has been demonstrated that it pays to have an extra man whose duty is to look after the lubrication of such mill bearings, but as the saving attributable to this man not only fails to show at the production end, but actually causes an increase here; his services usually are dispensed with, and the brass foundryman has to stand the gaff. We feel the fault in this case is most certainly in lack of lubrication.

Holes Show in Castings

We are making aluminum alloy hand wheels and experience considerable trouble on account of holes showing after the castings are machined. These castings show no holes on coming from the sand but when cut they look as the sample we are sending you. We are using scrap aluminum, and the core is a rosin core.

We are unable to state positively what causes the holes in the aluminum alloy casting because we are ignorant in regard to the operations carried out in making it. As the holes show only on the cope surface, common sense suggests the cope is the cause because it presents a surface to the molten metal that the latter is unable to lie quietly against. Has venting the cope surface been tried? Use a fine knitting needle provided the castings are made by hand, but if it is a machine job, either ram the cope softer, or use a coarser grade of molding sand. It is also possible the method of gating may be at fault and that it carries air down into the casting with the stream of metal. Try a smaller sprue; one that will be completely filled as the metal is poured, and also make it three times higher than would be done if the casting was brass. Air is being entrapped in some manner and by the pressure of the head of metal is being squeezed against the cope surface through which there is no escape for it. This is the best guess we can hazard from merely inspecting a small piece of the casting

Shows High Oxidation

We are making some small bushings of a mixture of 82 *per cent copper,* 12 *per cent zinc and* 6 *per cent lead, using briquette copper wire, prime western zinc and soft lead. We find that when these castings are machined they show flaws that extend entirely throughout the metal thickness and look as though crystals had been torn out by the tools. The castings are machined on an* 8 *pitch quadruple automatic tool and the metal must be soft to stand the hard grief given it. We are sending a partly machined casting to illustrate the difficulty we are having. The metal was poured hot.*

The alloy is peppered with oxides which break away under the tool, also some sulphur is present, in the form of sulphur dioxide as magnification shows gas cavities with discolored interiors. We are under the impression that the copper wire is largely to blame for this condition. It may be covered with oxide or it may be oxidized in melting. The mixture itself is one largely used, sometimes with the addition of 1 or 2 per cent of tin. Therefore, it cannot be the source of the trouble. Place a couple of ounces of phosphor copper in the bottom of each crucible for every hundred pounds of metal used. This will increase the fluidity of the alloy, and make it more easy for the dross to float to the surface. While the copper is melting, have it punched down as soon as it gets red hot. Do not permit the metal to sink down of its own accord. Continue melting in this manner until all the copper is down, and do not forget the charcoal covering. When the copper is melted, give it a thorough stirring, and allow it to get quite hot before adding the zinc and the lead. Then stir once more. The more the molten alloy is stirred the better as it brings up dross.

CARE OF GLUE IN THE PATTERN SHOP

(*Continued from Data Sheet No.* 654)

Melting the Glue

Melting of glue is a most critical operation. Many consumers are not as careful in this as they should be and as a result they frequently condemn a glue which, if handled properly in the soaking and melting, would yield superlative results. It must be seen that the glue melting compartment is at all times perfectly clean. This does not mean practically clean but *absolutely* clean. Unless this precaution is observed you will never get the maximum satisfaction from your glue.

If the glue has been soaked properly it will melt readily at 140 degrees Fahr. A minimum of 120 degrees Fahr. and maximum of 150 degrees Fahr. will give best results. The binding strength of glue depends almost entirely upon its penetrating qualities, and, to get maximum efficiency, a glue should be applied at a temperature that assures perfect fluidity. An underheated glue cannot give good results, because the body of the solution is too heavy to allow proper penetration. Underheating is to be avoided as much as overheating. *Under no circumstances allow the glue solution to boil or the vessel containing the glue solution to come in direct contact with flame or fire.* If you exceed a temperature of 160 degrees you will ruin the glue. This fact was proved by a test made at the Forest Products laboratory of the United States forest service. It was determined that glue heated for seven hours at 176 degrees lost about one-half of its joint, or tensile strength. At lower temperatures the loss in tensile strength was not as great as this. The most favorable temperature at which to keep glue was found to be 140 degrees.

By observing these precautions you will make a pound of glue go farther than by disregarding them. Copper melting pots are the best to use for glue, inasmuch as copper is the only metal not affected by the acid nature of steam or by the acids which may be in the glue itself.

Testing Glues

Correct comparative testing of glues is not the simple matter many assume it to be. With so limited a space, no attempt will be made to describe the various tests. However, it is essential that unless the glue and water are weighed carefully in each instance, the tests will be useless.

In making up glue be careful not to use too thick a solution. A glue

(*Concluded on Data Sheet No.* 656)

CARE OF GLUE IN THE PATTERN SHOP

(*Concluded from Data Sheet No.* 655)

of the consistency of milk does better work than a glue thick as cream.

Remember that glue is animal matter and after being soaked is subject to decomposition. To obtain satisfactory results in keeping and working qualities, glue pots must be cleaned frequently and thoroughly. Similarly brushes must also be cleaned.

Never use water from a boiler or steam pipe for soaking or thinning glue, as this water is apt to contain pipe rust or acid and these ingredients reduce the adhesive properties of the glue.

No glue will hold on green or unseasoned lumber. Good glue, properly prepared, used on warm or dry wood, will not let go.

Avoid draughts in the glue room.

Distributing Glue in the Shops

In many plants it is customary to have each workman dissolve the glue for use in small individual pots. This method is rather wasteful and, because of the dirt accumulating in the pots, is not productive of the best results. It is far better to dissolve the required quantity of glue for use in a large melting pot and to permit the solution to jell. The jelly may then be divided in small blocks and distributed to each operator to be melted by him as fast as required. The jelly may be made somewhat stronger than is required so that, in the course of working, each operator may dilute it to the desired degree with water. If this method is carried out carefully, it will be found that the glue will go farther, inasmuch as the person in charge of the central melting station will be careful to keep his pot clean, and will be able to devote the proper care to soaking and melting and, as a result of remelting by individual operators, it will be found that more glue is produced.

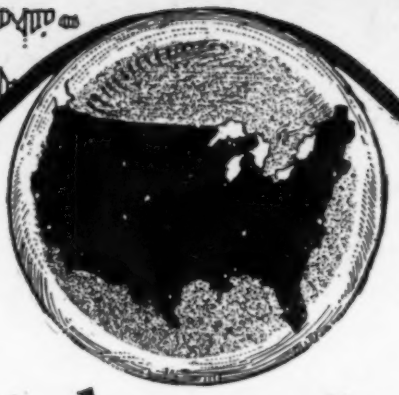
Use of Electrically Heated Glue Pots

Electrically heated glue pots may be maintained at an even temperature. A two-quart glue pot having an electrical capacity of 110 watts is said to consume 80 watts per hour and maintain a temperature of 150 degrees. On this basis the cost per eight-hour day at 5 cents per kilowatt-hour will be 3 cents.

THE FOUNDRY DATA SHEET, FEB. 1, 1927

Payment will be made for all contributions on foundry and pattern shop practice suitable for publication

Note—This sheet may be cut into two sections, 5 x 7 inches, and may be readily bound in notebook form.



Seeing America with The Foundry

Little Journeys to the homes of our readers

ARKANSAS has a total of 17 foundries of which

17 Melt Gray Iron
15 Nonferrous Depts. of other foundries
1 Melts Steel
9 Melt Aluminum

ARKANSAS, popularly known as the BEAR STATE, is the twenty-fifth commonwealth in size and twenty-fifth in population.

Bauxite, the ore from which aluminum is refined, petroleum, coal, lead and zinc, marble, slate and granite are the chief mineral products.

The most important manufacturing industry is the making of lumber and lumber products. The saw and lumber mills of the state represent a total investment of $90,000,000 and the annual value of the product is not less than $100,000,000.

The value of the cotton crop is approximately $140,000,000 and the second largest industry is the manufacture of cottonseed oil and cotton cake.

For building and repairing equipment necessary for the lumber, cotton and mining industries seventeen foundries are operating in Arkansas.

In ARKANSAS—THE FOUNDRY has 7 paid subscribers

"Wherever metals are cast you'll find THE FOUNDRY"

Bill Hears Home News From Abroad

By Pat Dwyer

PROWLING around the other night looking for something to read I found an old copy of *Ruggles of Red Gap*, a story which doubled me up in convulsions when I read it first many years ago. I sat down and read it over again and although in a general way I remembered the general trend of the story I enjoyed it as thoroughly in the second reading as I had in the first.

It is told in the first person by the faithful man servant of a most pathetic younger son of a noble house. The term younger in this instance is only relative since the honorable gentleman was well over 50 in actual years, but in point of mentality he would experience difficulty in making the grade with the advanced pupils in the kindergarten. With the mind of a child and the inclinations of a man about town he continually contracted the most entangling alliance with milliners, shop girls and other persons in the lower walks of life, from which he was extracted with the greatest difficulty by the faithful retainer. The minute he received his quarterly remittance from his elder brother the earl, he promptly ran to the gaming table and lost it. Then himself and Ruggles crept away into some obscure garret and hibernated until the next remittance arrived. In one of their temporarily flush periods in Paris, Ruggles attracted the attention of a newly wealthy American lady who was doing Paris and France and all them kind of places in company with her husband, the senator from a far western state, and a cousin who hid a heart of gold behind a hand-painted necktie. The lady had social aspirations and the instant she saw Ruggles she decided to take him back to America and put it all over the other ladies in town by installing in her home a genuine English butler lately in the service of a belted earl at The Towers, Chase-Wotton, Diddly-Come-in-the-Dell, near the Goose and Gander, Cheshire.

When this dynamic lady wanted anything she simply reached out and took it. She was that kind of a person if you know what I mean. The melancholy cousin Egbert summed her up in a few pregnant words when he advised the horrified Ruggles to accept his fate peaceably. He never gave Ruggles his proper name, but insisted much to that gentleman's bewilderment in addressing him as either Bill or Col.

"Say Bill," said he, "Lemme tell you what kind of a woman Mrs. Effie is. She would fight a rattlesnake and give the snake the first two bites."

At her instigation the husband and cousin inveigled the Hon. George into the American game of chance known as drawing poker and after they had cleaned him out, they offered to stake the entire winnings against his man Ruggles. As the honorable explained afterward to the victim, he was quite positive he had mastered the intricacies of the game by this time. Naturally he was deeply chagrined to find on laying down his hand that the hand held by one of his adversaries was better by a slight margin, a trifling difference I believe, in the arrangement of the pips. As a gentleman of the highest probity and honor he could not repudiate the wager and therefore reluctantly was obliged to render Ruggles up to the Americans.

Ruggles' adventures in America, his vast fund of misinformation and his naive comments delivered from the calm and lofty plane of British superiority on the habits and customs of the native Americans, their scenery, their towns, their houses and their peculiar idioms and grammatical inaccuracies, to use one of the same idioms, is a scream from start to finish.

The first time I read the story I regarded it merely as an extremely clever burlesque, an amusingly exaggerated expression of our traditional conception of the average Englishman. In the light of some recent literature that I have seen, I have been forced to revise that opinion to some extent. The author was hitting closer to the center of the target than I suspected. Apparently Ruggles again has been in our midst and has been airing his views on his return to the tight little island. Passing hurriedly through a foreign country a traveler is bound to gather some peculiar impressions. Patriotism is instilled into the heart of every child. He is taught that allegiance to the land of his birth is not only one, but the chief of the cardinal virtues. As he grows up he is reminded constantly that his country, his people, his habits and customs, his manufacturing processes, in fact his everything, is superior to any corresponding feature elsewhere. Consciously or unconsciously he assumes that everything in his own country is perfect. Therefore when he notes something in a for-

THE FALLS ARE HONORED BY A VISIT

eign country which does not coincide line for line with that to which he has been accustomed, he sets it down as inferior.

The foregoing observations are not confined to any nations or to any individuals. They apply to mankind in general. Class distinctions, standards of excellence and glances of contempt or amused tolerance are as prevalent in the country village as they are between sections of a city or between two nations. With these premises in mind, with charity for all and malice for none let us see some of the curious sights which recently attracted the attention of a foreign tourist. During an afternoon call in Philadelphia with the thermometer registering nearly 100 degrees, he was shocked at the offer of an innocuous iced beverage when his system craved tea. Tea was the correct thing at home, therefore he argued that a people who failed to realize the advantage of drenching their insides with this scalding liquid indeed must be far outside the pale. His time in New York was spent in the down town section. He did not see Harlem. On his way to the sesquicentennial exhibition in Philadelphia he passed through the black belt of that town and that leads him to observe sapiently that the blackamoors in Philadelphia far outnumber those in New York. He also discovered that most of the houses in America are constructed of a wood known as shingles and the roofs are painted green. In the better residential districts of various cities he was scandalized to note that the really fine lawns ornamented with flowering shrubs extended to the sidewalk without any wall or protective fence. How the inhabitants maintained any proper privacy with this indecent exposure passed his comprehension.

To the ordinary observer the general features on both sides of the Niagara river are alike. The people speak the same language, their interests practically are identical and constant intercourse is maintained. However the keen eye of our traveler noted a startling difference on the side which enjoys the protection of the British flag. The houses are better and partake more of the solid, substantial character of those at home. The power stations blend more harmoniously with the scenery than those on the American side. The straight, unimpressive half of the falls on the American side does not compare with the beauty and grandeur of the sweeping horseshoe curve on the Canadian side. The most peculiar feature of all, one that did more than any other to convince him that he really was on British soil was that the grass was much greener on that side of the international boundary line!

The fact that a local committee had taken care of all immigration and customs arrangements in advance, escaped his attention. The border authorities passed the party back and forth without examination or comment and he calmly sets this down to the fact that these hard boiled lads were impressed by the respectable appearance of the travelers.

THE LIFE SAVER ARRIVES WITH A POT OF TEA

I am afraid that any prospective immigrant or enterprising member of the bootlegging fraternity who takes advantage of this hint and attempts to cross the border disguised in a pair of spats, a cane, a high hat and a British accent will be disappointed grievously.

The most astonishing incident in the entire journey occurred between Philadelphia and Buffalo. This trip was scheduled for a daylight ride to give the visitors an opportunity of viewing the scenic wonders of the Lehigh valley. Somewhere beyond Bethlehem the train passed through the quaint town of Kalamazoo. The author who had his trusty camera by him at all times took a picture of the party standing on the railroad track in front of the station. Unfortunately the railroad coaches blot out all view of the station except a few peaks on the roof, therefore the name is not visible.

At one time or another Americans have been credited with spectacular feats in moving large buildings entire. Several instances are on record where small towns have been moved a considerable distance on account of industrial operations, but this feat of a stranger only a few days in the country, moving a large city 700 miles from the western side of Michigan to the eastern side of Pennsylvania, constitutes a record that I rather fancy will stand for some time.

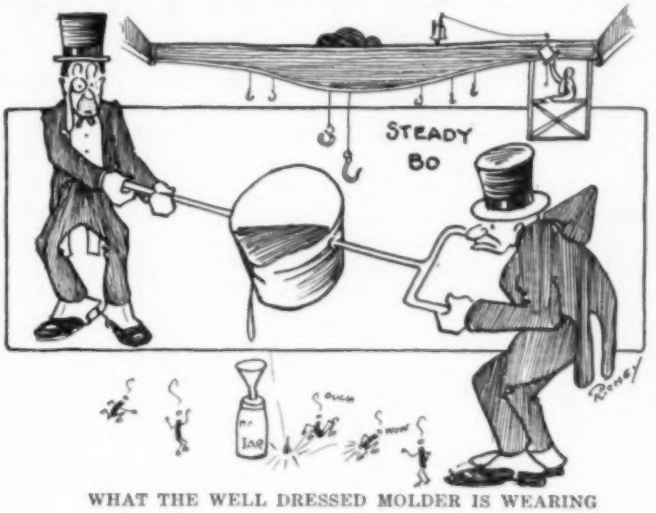
I showed the story to Bill one night and after he had read it mostly in amused silence, I asked him what he thought about it. "Well," said Bill, "I'll tell you. Writing is a trade like any other and you cannot expect an apprentice to be as competent as a journeyman. Accuracy is the first essential of descriptive writing and accuracy is impossible without a true perspective, and a true perspective is not acquired during the course of a hurried visit. Considering the extent of territory covered in a limited time I think the writer acquitted himself fairly well. He must have a marvelous memory and a good imagination. The fact that his national pride and preconceived prejudices color his opinions is only natural. Americans on hurried tours of Europe bring back a similar mass of undigested information. Their risibles are affected by the toy trains, the caste system, red tape, serving tea, cricket, importance attached to seniority, tradition and precedent, neck cloths and waist coats worn by the molders and the time wasted in imparting a piano finish to a casting irrespective of whether it is a turbine casing or a manhole designed to be buried in masonry. All these things seem funny to us, but you would have a fat chance trying to convince a native son that there is anything funny about them —the various features listed, I mean, not the people themselves.

"However," Bill continued, "some of these lads are funny, too. I don't know if it is intentional or whether they actually imagine they saw some of the things they describe.

"You may remember about a year ago a prominent British paper sent a number of men representing the various trades over to the United States to observe and report on industrial conditions. The molder's representative described his experiences to a branch of the Foundrymen's association at a recent meeting. He visited perhaps two dozen shops out of approximately 7000 in North America. He viewed everything through the eye of the typical

skilled workman who has bowed down for generations before the fetish of manual craftsmanship. Reduction in labor cost, mass production with unskilled labor, utilization of mechanical appliances which do not in any way impair the utility of the castings, are factors to him not worthy of consideration. They might have application in America where no standards are recognized, but over here—!

"He passed through several towns where loam molding is practiced extensively, but because he saw no loam molds going forward in the few shops he visited, he concluded that this fine art is unknown in America. In one or two shops he saw immense molds made in pits by the simple expedient of assembling a number of dry sand cores. The fact that highly skilled and high-priced loam molders were replaced by common labor to a considerable extent and that the castings were produced at a much lower cost made no appeal to him. The foundry business is on the way to the bad place with a tin can tied to its tail!



WHAT THE WELL DRESSED MOLDER IS WEARING

"Touching on the subject of wages and living conditions he had a genuine surprise in Pittsburgh where the molders are paid the astounding sum of £9 to £10 ($45 to $50) a week. Without announcement of any kind he called at the home of a former British molder who had been in America for the past 23 years. He was quite astonished to note the character of the home in which this man resided. Upon pressing the bell the door was opened by a tidy little colored maid who informed him that the master was at dinner. In a few moments he was ushered into the dining room where he found the entire family attired in correct evening clothes. Afterward, although it sounds incredible, his host drove him back to his hotel in his own 80-horsepower motor car.

"The narrator's comment," said Bill. "At the end of the story is the funniest feature about it. It is worthy of Merton of the Movies. Do you think he saw anything funny in this worthy molder attiring himself in dress clothes before attacking the evening corn beef and cabbage? He did not. Listen to the exact words clipped from the account as printed: *I do not say that that is the standard of life of every molder in the United States.* Note the patronizing reference to the dumb natives. *But I do say it is a fair example of a man who is trying to get on.*

"God help all poor sailors on a night like this," said Bill. "Conditions in the foundry industry indeed have fallen on evil days when the molders in Pittsburgh take to tricking themselves out in dress suits. When I worked in the Mesta many years ago big Jim Dalton had one, but it gave him no prestige and no person considered it a proof that he was getting on. In fact it was a mystery how Jim either got it on or stayed inside it. The suit or rather the suits, the coat and pants were of different vintages, had been made for men of considerably less than Jim's inches. He had acquired them during one of the submerged periods when his finances were at a particularly low ebb and when it was a case of any port in a storm. They not only served him as a dress suit at night, down at Jack's place, but they also covered his portly form in the morning and at noon. Sometimes he slept in them. What you might call a good, all around suit, fit for all occasions.

"Good old Jim. I wonder where he is now. I met him first in Cleveland where we roomed together and worked in the old Fulton down on the Flats. He had the most fertile imagination and the greatest flow of language of any man I ever met. Almost invariably he talked me to sleep at night.

"All this talk of dress suits reminds me of one of his favorite topics, a shop in the East where castings are made in precious metals. According to this veracious historian the molders went to work there dressed in the height of fashion, cane, top hat, spats and a gardenia in the button hole. They were met at the door by a menial in a pair of plush breeches who accepted their hats and canes and laid them away in a priceless buhl cabinet until the hour for retiring arrived when he yielded them up before calling a carriage to convey the artists to their respective homes.

"A special brand of sand imported from France was employed exclusively. It was washed and sterilized and faintly scented with mignonette. It was never used more than once. The molders wore surgeon's rubber gloves to protect their manicured fingers. All the tools were heavily gold plated, the handles of the trowels were encrusted cleverly with precious stones and each man's individual platinum swab pot bore his monogram in ponderously embossed style on one side. Every man had four helpers. One to do all the lifting, a second to hand him each tool as he required it, a third to remove the tools, wrap them in cotton wool and replace them in the mahogany case and a fourth to fan him with a plume of peacock feathers. A light buffet lunch was served at 10 a. m., a more substantial repast at noon and a bevy of beautiful young maidens circulated through the shop at 3 p. m. pouring tea and distributing honey and wafers."

"I asked Jim one time why he did not stay there. 'Say, kid,' he replied, 'after about a week d' joint got on me noives. I hops out troo de back door at noon one day and gets me a can o' suds. On de way back de gaffer sees me wipin' off de froth wid de back of me hand an' he ties de can on me.'"

Manufacturing Assets Bought by Company

The Union Mfg. Co., New Britain, Conn., has purchased the manufacturing assets of the Franklin-Moore Co., Winsted, Conn., including patterns, tools, finished goods, stock in process, etc. The latter firm manufactured chain hoists, blocks and trolleys. The Union Mfg. Co. will consolidate the manufacture and distribution of this line with its present products, lathe, drill and planer chucks. A. F. Corvin is president.

The Electric Controller & Mfg. Co., Cleveland, has removed its Toronto, Ont., office from the Traders Bank building to 415 Metropolitan building in the Canadian city.

HE HUNTS *The Wily North American Brand of Malleables*

BY A slight substitution of geographical names one easily might apply the opening lines of the old missionary hymn and say that Willis T. Howell, at present manager of the Pacific Malleable Castings Co., Oakland, Calif., has made malleable castings from Greenland's icy mountains to India's coral strand. However, Michigan shares many features in common with Greenland in the winter while India and Indiana share a common heritage in that neither one has a coral strand. Rhymers of all ages, missionary or otherwise never have been known to hesitate an instant when confronted with a choice between a word that represents accuracy and one that will rhyme with one in a preceding or following line. Fortunately the accuracy incidental to cold prose indicates that Willis first stalked the wily malleable game in Indiana, followed it to Pa'kipsie which if not on the Atlantic coast, at least is within smelling distance of salt water and finally after many a siege and ambuscade that lasted for varying periods along the way, he arrived in Oakland, Calif., one of the few towns in that state which up to the present has not been annexed by Los Angeles.

Shortly before the boy arrived at an age to choose a career, specifically in 1888, the foundry firm, Sweet & Doyle, Troy, N. Y., built a jobbing malleable iron foundry in his home town Marion, Ind., and probably unconsciously on the firm's part, bent the twig from which later the tree was inclined. During the school vacations of '93 and '94 he mingled with the crew of honest artizans toiling in the foundry. He exchanged his valuable services for 50 cents a day and during the darkest hours he was buoyed up with the knowledge that he was going to quit at the close of the vacation period.

In 1895 he had a heart to heart talk with himself and impartially weighed the relative advantages of going to school or learning a trade. Of the two evils he unhesitatingly chose the lesser. Shortly after school started in the fall he threw away his books, figuratively kissed the school house good bye and entered the foundry as an apprentice molder. Here he worked for four years and accumulated a fabulous sum of money through the company's plan of withholding 20 per cent of the first year's earnings, 15 per cent the second year, 10 per cent the third and 5 per cent the fourth and last year. The entire amount was turned over at the close of the apprenticeship period. With financial independence thus assured, the youthful journeyman was encouraged to spread his wings and try a trial flight from the old nest. The first flights were short, to Muncie, Indianapolis and South Bend, Ind. Confidence grew with the years and as previously stated the flights have been getting longer and longer, culminating in the latest hop to Oakland, Calif.

Growing appreciation of the vastness of the foundry field induced him to enter the Armour Institute, Chicago in 1902 where he remained for 7 years operating the foundry by day and absorbing information by night. He joined the Chicago Foundrymen's association and cultivated the acquaintance of many men prominent in the foundry industry. Opportunity once more to enter the commercial field induced him to accept a position as assistant shop director at the plant of the National Malleable Castings Co., Chicago. A few months after he assumed his new duties, the veteran melter for the company died suddenly and his duties were transferred to the shoulders of the young director.

The arrangement was supposed to be only temporary, but after working from 4 a.m until 8 p.m. for several months he resigned the position thankfully to accept a position as foundry superintendent with the Atlas Engine Co., Indianapolis, where he remained for two years.

His entry into the big league came with his acceptance of a position with the Oliver Chilled Plow Co., South Bend, Ind., where he had charge of a foundry with four continuous melting cupolas, eight malleable furnaces, 16 crucible melting steel furnaces and one 2-ton bessemer converter. After 18 month's service he accepted a position with double the salary to operate a new foundry built in Poughkeepsie, N. Y. by the Moline Plow Co. Here he remained in charge of 1200 men four years.

An offer to superintend the building and operation of a new malleable foundry for the Kalamazoo Stove Co., brought him back to Michigan where he installed his first powdered coal equipment and was initiated into the mysteries of soliciting orders to keep the plant running.

At the beginning of the war he joined Stewart-Warner Co., Beloit Wis., and planned all the equipment to secure a production of 60 000 hand grenades and 40 000 rifle grenades a day. At the close of the war he went with the Emerson-Brantigham Co., Rockford, Ill. where he took charge of two of the company's gray iron foundries and converted one into a malleable foundry for the production of castings for the agricultural industry. He remained with this company for six years, before accepting his present position as foundry manager with the Pacific Malleable Iron Castings Co., Oakland, Calif.

Milestones in Foundry Progress

As Recorded in the ***February*** *Issues of* THE FOUNDRY, *Thirty, Twenty and Ten Years Ago*

1897

S. KNIGHT heads the February, 1897 issue of THE FOUNDRY with a detailed discussion of the mechanical and physical tests then practiced on cast iron. He deplored the lack of uniformity in the size of bars used for the deflection and breaking tests. The microscope was recommended as an aid in checking the results of chemical and physical tests.

* * *

Wrought iron, melted in crucibles and rendered fluid by the addition of 3 to 5 per cent of aluminum, was described. This product was recommended for special service in competition with drop forgings.

* * *

The Texas Foundrymen's association protested to the state legislature against the employment of convict labor in state owned foundries, to produce castings in competition with private shops.

* * *

And just supposing some of these accused ball players were convicted and sent to a penitentiary foundry. Some of them should need no training in casting, but doubtless the misruns would increase.

* * *

The secretary of the navy was paid some backhanded compliments on employing civilian inspectors at starvation salaries to pass upon materials purchased. Steel casting purchases, in particular, were under scrutiny.

* * *

The Philadelphia Foundrymen's association discussed the subject of credit and referred to instances where customers had removed their patterns to a new jobbing shop, when the foundry first employed insisted upon payment for work delivered.

* * *

RUTHLESS RHYMES

Foundryman Jenks was a playful cuss,
And his wit ran to practical jokes.
His loaded cigars kicked up such a fuss,
That his shopmates lay off of his smokes.
A. V.

* * *

Thomas D. West contributed a discussion on the relative merits of closed and open feeding heads and risers on iron castings.

Faked Foundry Facts

Hot Iron

In a statement published in the technical press. P. H. Griffin corrected several previous statements to the effect that American chilled cast iron wheels were being introduced into Austria-Hungary. He claimed the knowledge came from Hungary in the first place.

1907

CHILLED iron car wheel manufacture engaged attention in the February, 1907 issue of THE FOUNDRY. An illustrated article on the subject gave full data on the circular floor and straight line methods of continuous production.

* * *

A compressed air operated, cupola charging machine was shown and various hoists for handling the heavy doors on the large car wheel shop cupolas were noted.

* * *

W. M. Carr described a Russian open-hearth furnace designed to melt and refine a single ton of steel at a charge.

* * *

A paper from a British foundry meeting disclosed the growing interest of a standard method of grading pig iron by analysis.

* * *

In that day the manufacturers of pig iron in Britain regarded the composition as something of a secret. More information on the content of various elements was demanded by the British writer.

* * *

Perhaps the writer of this British paper feared too much "silly con" in the iron he purchased.

* * *

No. 2 foundry iron was selling at $23, Birmingham and $26.50 Chicago. Lower prices were obtainable for iron contracted six months ahead.

* * *

The Marion Foundry & Machine Co., Marion, O., purchased the plant of the Edison Foundry & Machine Co. of that city.

1917

NEW ENGLAND SHIP & ENGINE BUILDING CO., Groton, Conn. provided the material for the leading article in THE FOUNDRY of February, 1917. This shop was constructed upon the side of a hill and the plant design took advantage of this location.

* * *

David McLain, Milwaukee, presented a paper on the properties of semisteel castings at the Cleveland meeting of the American Foundrymen's association the preceding fall. This paper which was given in full in THE FOUNDRY presented some interesting data on the use of semisteel for shells, a practice later adopted by the allied governments.

* * *

Transportation difficulties threatened the production of castings plants. Foundries were using inferior grades of fuel and iron and were resorting to scrap to keep their shops in operation. No. 2 foundry iron was selling for $31.95 Pittsburgh and $23, Birmingham, while coke was $10 to $11 a ton.

The Shakeout

DAN M. AVEY, Editor

PAT DWYER, Engineering Editor
FRANK G. STEINEBACH, Associate Editor

CHARLES VICKERS, Nonferrous Editor
EDWIN BREMER, Associate Editor

¶ Why Can't We Make Them Here?

SEVERAL newspaper stories within the past few months should challenge the attention of American foundrymen and move them at least to publish a protest even if their activities could not be extended at this time. Other patriotic citizens well might take up a study of the subject, but since the foundrymen are affected particularly it is only appropriate that they should initiate any movement looking toward an improvement in conditions that now exist. One story deals with a big bell that was cast in England and shipped to Philadelphia where it is designed to hang in the tower of a department store building. A second story is concerned with an immense bronze group recently erected in Newark, N. J., and a third considers the possibility of repairing or replacing the famous Liberty bell in Independence Hall, Philadelphia.

ON THE third count a difference of opinion may exist whether it is better or more expedient to mend the old bell or to cast a new one. A new bell could be suspended in a tower and rung upon appropriate occasions. To all intent and purpose it would be the Liberty bell since it takes the place of the cracked original. However, in the eyes of a certain section of the community the old bell is a relic even if it is of no practical use in its present condition. It is the actual bell that announced the signing of the Declaration of Independence and therefore cannot be replaced by a substitute. This line of reasoning has its weak point in that the signers of the document have been replaced many times, still no person questions the right of the modern representatives of the people to their seats in the houses of congress. However, reason never had and probably never will have anything but scant attention when it conflicts with sentiment.

IT IS A pity the same patriotic sentiment could not be aroused in connection with the department store bell and with the immense bronze group commemorating the American soldier in many wars that has been set up in Newark. Both of these castings could have been made in this country and they constitute a pitiful comment on our boasted wealth when it is realized that one of the reasons they were ordered in Europe is said to be that a few dollars were saved thereby. In the last analysis even that statement will not stand. Europe has the money and we have the castings. If the order had been filled here we would have both the castings and the money paid for them. And our national pride would not be tarnished.

¶ Where Many Minds Meet

ONE of the prominent district foundrymen's associations recently has adopted an innovation which bids fair to render the meeting extremely interesting. The secretary announced the installation of a question box to which all members are requested to submit subjects for discussion. Specifically, each member is expected to ask a question on some phase of his business on which he wants further light. The expectation is that among the members present some person or possibly a number of persons will be in a position to present a solution for the problem. A modern application of the old proverb that in a multiplicity of counsellors there is wisdom. Even if a direct solution is not furnished for a specific problem, it is felt that an open discussion is bound to result in a greater diffusion of knowledge.

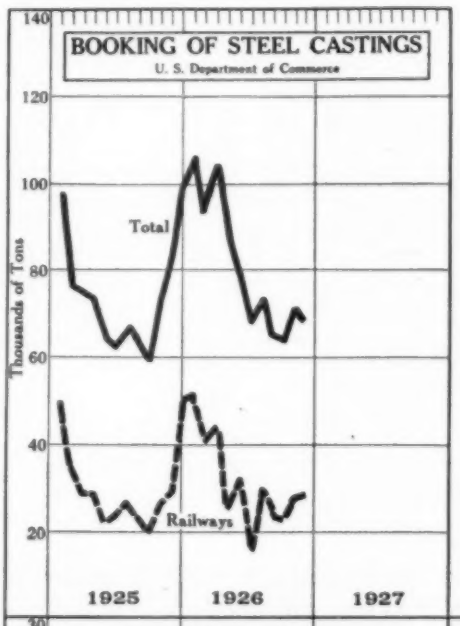
THE idea is worthy of hearty support and imitation and should commend itself to foundrymen's associations in general. Modern foundry practice no longer is a hit-or-miss, rule-of-thumb proposition. It is a highly specialized, highly involved and highly intricate business with ramifications extending into the fields of finance, economics, applied mechanics and the science of metallurgy besides the former merely technical details of making the molds and melting the metal. Due to industrial conditions, the modern master foundryman is confronted with a range of problems that merit the keenest thought and the most extensive discussion among men when they gather together with the avowed intention of helping each other.

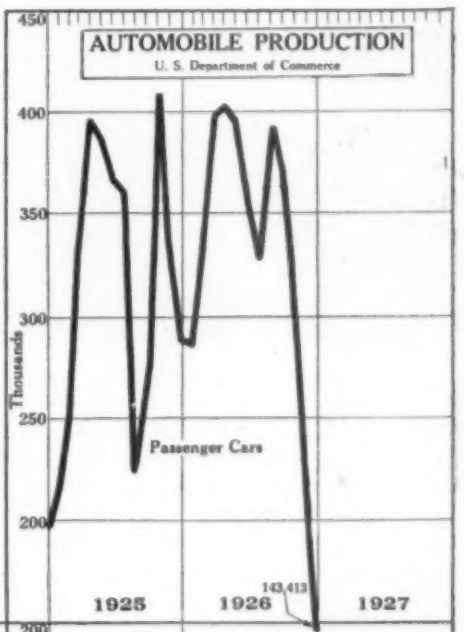
Trade Trends in Tabloid

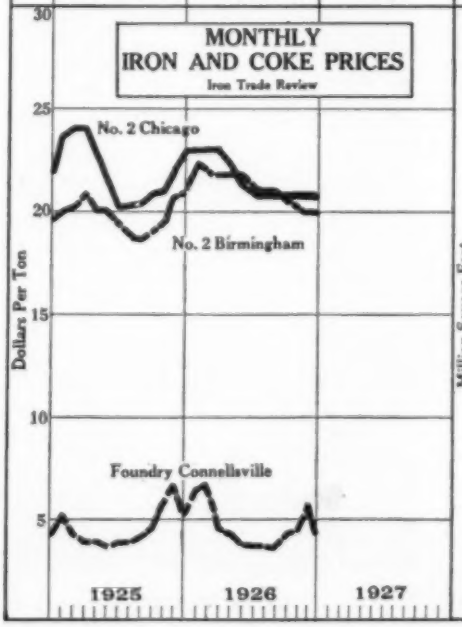
RAILROAD buying is occupying the attention of manufacturers in practically every branch of the metal working industry. With heavy car orders appearing in December, the purchase of approximately 10,000 cars in the early part of January and an active inquiry for at least twice that many, the outlook is favorable for castings business from this source throughout the first half of 1927. This belief is strengthened by the high total of freight car loadings which obtains. The week ending Jan. 8 showed a sharp increase in loadings to a point approaching the million mark that frequently was encountered in 1926. Implement makers, who enjoyed an exceptional business last year, expect a fair average from 1927. The demand for seeding and cultivating equipment, it is believed, will not be as heavy as the requirements for harvesting machinery later in the year. Automotive conditions are uncertain. Purchases during the past two months have been light and December output of automobiles was the lowest for a long period. Some stimulating effect is expected from the shows now in progress and the announcement of improvements and changes in construction. Cast-iron pipe buying in the Middle West has been strong. Stove and radiator foundries report slight declines in operation. Southern pig iron producers have lowered their prices and a lower aluminum price is quoted.

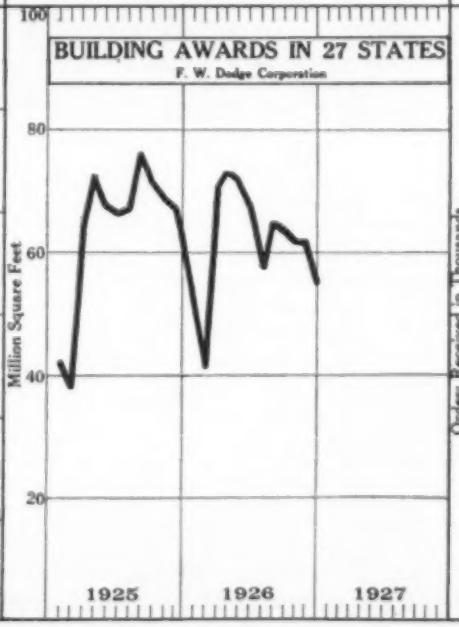
RAW MATERIAL PRICES

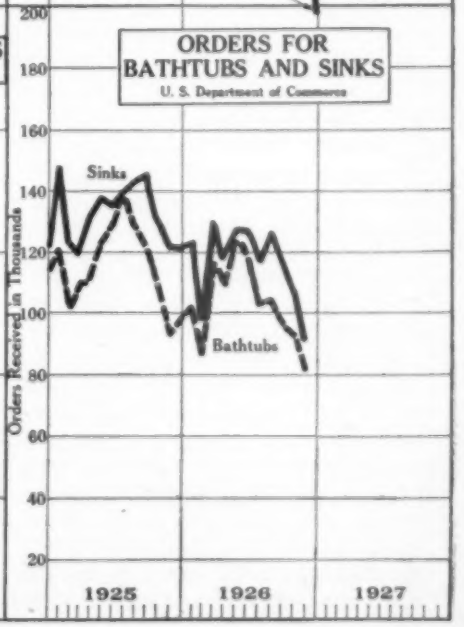
	Jan. 22, 1927
Iron	
No. 2 foundry, Valley	$18.50
No. 2 southern Birmingham	18.00
No. 2 foundry, Chicago	21.00
No. 2 foundry, Philadelphia	22.26 to 22.76
No. 2 foundry, Buffalo	20.00
Basic, Valley	18.50
Basic, Buffalo	19.00
Malleable, Chicago	21.00
Malleable, Buffalo	19.00 to 20.00
Coke	
Connellsville foundry coke	$4.50 to 5.50
Wise county foundry coke	6.00
Scrap	
Heavy melting steel, Valley	$16.50
Heavy melting steel, Pitts.	16.50 to 17.00
Heavy melting steel, Chicago	13.25 to 13.75
Stove plate, Chicago	14.00 to 14.50
No. 1 cast, New York	12.25 to 13.00
No. 1 cast, Chicago	17.00 to 17.50
No. 1 cast, Philadelphia	17.00 to 18.00
No. 1 cast, Pittsburgh	16.00 to 16.50
No. 1 cast, Birmingham	16.00 to 16.50
No. 1 cast, Buffalo	16.75 to 17.25
Car wheels, iron, Pittsburgh	16.00 to 16.50
Car wheels, iron, Chicago	15.00 to 15.50
Railroad malleable, Chicago	16.25 to 16.75
Agricultural, mal., Chicago	15.25 to 15.75
Malleable, Buffalo	17.00 to 17.50
Railroad malleable, Pitts.	16.50 to 17.00
Nonferrous Metals	Cents per pound
Casting copper, refinery	12.85
Electro copper, producers	13.25 to 13.37½
Straits tin	66.62½
Lead, New York	7.50
Antimony, New York	14.50
Nickel, electro	39.00
Aluminum, No. 12, prod'rs	24.50
Aluminum, No. 12 remelt	21.00
Zinc, E. St. Louis, Ill.	6.50 to 6.55











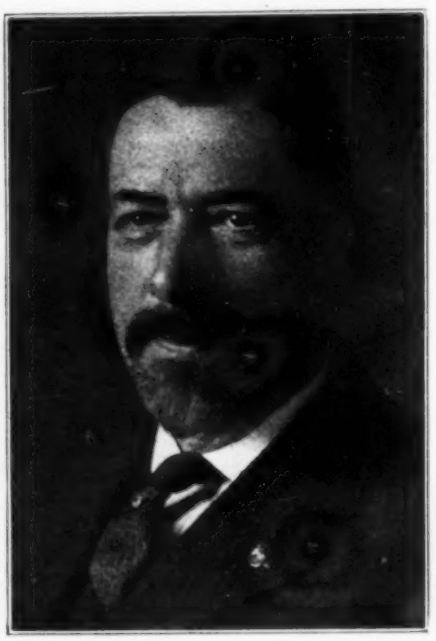
Comings and Goings of Foundrymen

HENRY S. CHAFEE, recently elected president of the New England Foundrymen's association for the year 1927, has been active in the foundry industry for 18 years. In 1909, immediately after his

HENRY S. CHAFEE

graduation from Brown university Providence, R. I., he entered the pattern shop of the Builders Iron Foundry, also of Providence, and since then has been associated with that company in various capacities. From his earliest work in the pattern shop he gradually advanced through other departments, spending considerable time on the floor of the foundry and in the operation of various machines in the machine shop. About six years ago he was made secretary of the company, which position he now holds. He was elected vice president of the New England Foundrymen's association a year ago, and now succeeds Henry P. Blumenauer, vice president of the Arcade Malleable Iron Co., Worcester, Mass., as president. He is prominent in the industrial and civic life of his city. He is a member of the Providence Engineering society, is treasurer of the Rhode Island branch of the National Metal Trades association, and is a member of the executive committee of the Rhode Island Employers association. The company with which he is associated, the Builders Iron Foundry, is an old established firm making large surface and face grinders, water pipe fittings, and Venturi meters. This company was organized in 1820, and has been prominent in the manufacture of ordnance since then. Mr. Chafee's chief hobbies are the outdoor sports. He plays golf, but he himself denies any skill in this particular field and he also is an enthusiastic fisherman. He is the first president of the New England Foundrymen's association from Rhode Island since T. R. Scott of Brown & Sharpe Mfg. Co., Providence, was president in 1917.

Although still young, Fred F. Stockwell is in a sense father of the New England Foundrymen's association. He was present at the inception of the



FRED F. STOCKWELL

association, and has been secretary for 31 consecutive years. Presidents and other officers come and go, but Mr. Stockwell stays as the secretary. No other man has been present at half the number of meetings that Mr. Stockwell has attended. No other man knows as many of the members, and it is doubtful if there is anyone to compete with Mr. Stockwell in his knowledge of the activity of New England foundrymen during the past 25 years. At the recent annual meeting of the New England Foundrymen's association Mr. Stockwell unanimously was elected secretary for 1927. When not looking after affairs of the association, Mr. Stockwell is president and treasurer of Barbour-Stockwell Co., founders, general machinists, and manufacturers of special railway track work in Cambridge, Mass. His term as president of this company runs a close second to his term as secretary of the New England Foundrymen's association, for he was elected president in 1901. This year Mr. Stockwell's son Ernest F. Stockwell, who is also associated with Barbour-Stockwell Co. was elected to membership on the executive committee.

Fred H. Moyer has been elected vice president of the Mackintosh-Hemphill Co., Pittsburgh, and will give particular attention to the sales and engineering departments. Mr. Moyer has had wide experience in general steelworks practice and has been intimately associated with the industry since his graduation from Cornell university in 1899. His earlier training was received under E. E. Slick, former chief engineer of the Carnegie Steel Co. He has contributed to the engineering development of some of the largest steel plants in the country including the Clairton Works, Carnegie Steel Co.; Gary plant, Indiana Steel Co.; and the Cambria Steel Co., in the capacity of chief engineer as well as in operating capacities with the Pitts-

FRED H. MOYER

burgh Crucible Steel Co., and the United Alloy Steel Corp.

William T. Brierly, head of the Milbury Steel Foundry Co., Milbury, Mass., recently was elected president of the Employers Association of Worcester County.

A. L. Bell, president of the Ridgway Dynamo & Engine Co., Ridgway, Pa., for the past 20 years, has resigned. He had been connected with the company for 40 years.

F. F. Fitzpatrick, president of the American Locomotive Co., and Dallas D. Pratt have been elected directors of the American Car & Foundry Co., New York.

Thomas A. Finn, Worcester Foundry Co., Worcester, Mass., has been elected president of the Worcester County Foundrymen's association to succeed Henry P. Blumenauer, who has been president during the past 2 years. Milo H. Hamilton, Wells Chemical Bronze Works, Worcester, has been elected secretary of the association.

James A. Davies, who has been assistant general superintendent of the South Philadelphia works of the Westinghouse Electric & Mfg. Co., Philadelphia for the past 8 years has been appointed general superintendent, succeeding the late H. M. Giles. Mr. Davies was born in Brighton, England, and received his preparatory education in the public schools of that city. Later studied mechanical engineering at the Northern Polytechnic institute. He served his apprenticeship as machinist with the National Engineering Co., London, and subsequently became draftsman with J. I. Thornycroft & Co. He also worked for the Humphreys Tennant Co., London, and the J. S. White & Co., Cowes, England. In 1909 Mr. Davies came to the United States and became connected with the Westinghouse company. Five years later he was promoted to engineer in the marine department and in 1919 was made assistant general superintendent. Alfred Voysey has been appointed to succeed Mr. Davies as assistant general superintendent and James Lyons succeeds Mr. Voysey as supervisor of production department.

JAMES A. DAVIES

Jens Hansen, Burmeister & Wain, Copenhagen, Denmark, is touring the United States visiting foundries. He has been here since the Detroit convention of the American Foundrymen.

Charles U. Unterzuber, who for the past 22 years has been associated with the Cleveland Nickel Works and the Cleveland Chaplet & Mfg. Co., Cleveland, has been made general manager of these interests. The companies manufacture tumbling barrels and a complete line of chaplets for foundry service. Before his affiliation with the firms mentioned Mr. Unterzuber was assistant to the general manager of the Walworth Run Foundry Co., Cleveland.

CHARLES U. UNTERZUBER

Dr. F. C. Langenburg, formerly director of laboratories for the Watertown arsenal, Watertown, Mass., has become associated with the Climax Molybdenum Co., New York, and will head the firm's research department.

Richard P. Tell observed his silver jubilee as president and general general manager of the National Brake & Electric Co., and its affiliated firm, the National Steel Foundries Co., Milwaukee, on Jan. 3. Associates presented him with a desk clock, the presentation being made by P. L. Crittenden, chief engineer.

V. E. McMullen has been made manager of the Indianapolis plant of Fairbanks-Morse & Co. He succeeds B. J. Meyer, who has been transferred to the Chicago headquarters of the company. Mr. McMullen has been an engineer and division supervisor at the company's plant at Beloit, Wis., for several years.

J. R. THOMPSON

Appointed works manager, Westinghouse Electric & Mfg. Co., Trafford City, Pa., as noted in the Jan. 15 issue of THE FOUNDRY

Carl S. Dixon has been appointed works superintendent of the Pittsfield works of the General Electric Co., Pittsfield, Mass., to succeed Arthur F. Blasdell, resigned. Mr. Dixon has been connected with the Pittsfield works for the past 16 years. For several years prior to 1915 he was foreman of the castings section of the foundry. He was made a division superintendent in 1915.

D. F. Edwards has been elected president of the Saco Lowell Shops, Boston, succeeding R. F. Herrick Sr., who remains a director. Mr. Edwards was associated with C. W. Nash, president, Nash Motors Co., Racine, Wis., for 12 years. For several years he was first vice president of the Wickwire-Spencer Steel Co., and subsequently president. He resigned from that position in September to join the research bureau of Harvard university, Cambridge, Mass.

Chicago Foundrymen Elect Officers

The Chicago Foundrymen's club has elected the following officers for 1927: G. H. Rolinson, American Brake Shoe & Foundry Co., president; Gottfrid Olson, Illinois Malleable Iron Co., vice president. Directors are: T. D. McGrory, Advance Milling Co.; J. H. Hopp, Hopp-Patterson Co., Roy Frazier, Hansell-Elcock Co., and E. B. Sherwin, Chicago Hardware Foundry Co.

Foundrymen Meet

The regular meeting of the Buffalo Foundrymen's association was held at the club rooms, 140 Chandler street on Jan. 12. Motion pictures of sand blasting operations were shown by the U. S. Silica Co., Chicago. Edward H. Stehman was the speaker of the evening.

Joins Engineering Firm

Lester B. Paterson has resigned from the American Locomotive Co., New York, and is now associated with the Combustion Engineering Corp., as assistant production manager.

Changes Affiliation

Stephen McGovern, who for 12 years has been connected with the pig iron and coke business of the St. Louis offices of the Matthew Addy Co. and the Domhoff & Joyce Co., and more recently with the Green Foundry Co., of St. Louis, has joined the sales force of the St. Louis Coke & Iron Corp., at St. Louis.

J. L. Brierton Is Dead

James L. Brierton, vice president and general manager in charge of southern operations, Central Foundry Co., and vice president and general manager, Central Iron & Coal Co., both at Holt, Ala., died Dec. 23 in Birmingham, Ala. He was born at Irondale, Mo., March 31, 1875 and began his career with the Iron Mountain railroad as telegraph operator. About 1900 Mr. Brierton became associated with the Tennessee Coal, Iron & Railroad Co., Ensley, Ala., and remained there until 1906 when he became associated with the Central Iron & Coal Co., as assistant to the vice president. In 1915 he became operating manager of the Alabama & New Orleans Transportation Co., New Orleans. During and immediately after the war he was engaged in the construction of steel, oil-tank vessels at Violet, La. Mr. Brierton was recalled in 1920 to become assistant to the vice president and general manager of the Central Iron Co. and in December 1921 was made vice president and general manager. Within the past year he also was made vice president and general manager in charge of all southern operations of the Central Foundry Co. He took an active part in the civic affairs of Tuscaloosa, Ala., and was a member of the chamber of commerce.

J. L. Brierton

Obituary

Capt. A. W. Margedant, president of the Central Foundry Co., Hamilton, O., died recently in that city.

Isaac Durlach, president of the Durlach Car & Iron Works, Brooklyn, N. Y., died Jan. 12. He was 70 years old.

William H. McCormack secretary of the West Toronto, Ont., plant of the Gurney Foundry Co., died recently from injuiries sustained in an accident.

John A. Armstrong, secretary-treasurer of the Holbrook-Armstrong Iron Co., Racine, Wis., and well known in the gray iron casting trade, died Jan. 7 following a heart attack. He was born in Racine in 1859 and in 1900 assisted in founding the Holbrook-Armstrong foundry, which he managed until his death.

Foundry Association Directory

American Foundrymen's Association

President, S. W. Utley, Detroit Steel Casting Co., Detroit; secretary-treasurer, C. E. Hoyt, 140 South Dearborn street, Chicago; technical secretary, R. E. Kennedy, 909 W. California street, Urbana, Ill.

The Buffalo Foundrymen
Buffalo

President, J. McArthur, Washington Iron Works; secretary, W. J. Wark, E. J. Woodison Co., 146 Chandler street. Meetings the third Wednesday of the month at 146 Chandler street.

Chicago Foundrymen's Club
Chicago

President, G. H. Rolinson, American Brake Shoe & Foundry Co., Chicago. Meetings second Saturday in each month at the City club, 315 Plymouth court.

Connecticut Foundrymen's Association

President, Fred W. Stickle, Capitol Foundry Co., Hartford, Conn.; secretary, C. S. Neumann, Union Mfg. Co., New Britain, Conn. Meetings are on second Friday of each month in various parts of the state.

Detroit Foundrymen's Association
Detroit

President, Robert G. Crawford, Atlas Foundry Co., 131 South Artillery street, Detroit; secretary, Russell M. Scott, Packard Motor Co., 1580 East Grand boulevard, Detroit. Meetings third Thursday in each month at the Union League club, 35 Grand River avenue, Detroit.

Metropolitan Brass Founders' Association
New York

President, William Ember, Thomas Harper, 62 Delevan street, Brooklyn, N. Y.; secretary William E. Paulson, Thomas Paulson & Son Inc., 97 Second avenue, Brooklyn, N. Y. Meeting second Wednesday in each month at the Building Trades club, 34 West Thirty-third street, New York.

Newark Foundrymen's Association
Newark, N. J.

President, J. L. Carter, Barlow Foundry Inc., Newark; secretary, W. H. Mantz, Atlas Foundry Co., Irvington, N. J. Meeting called by president.

New England Foundrymen's Association

President, Henry S. Chafee, Builders Iron Foundry, Providence, R. I.; secretary, Fred F. Stockwell, 205 Broadway, Cambridgeport, Mass. Meetings second Wednesday of each month at the Exchange club, Boston. Outings usually are held in the summer months.

Ohio State Foundrymen's Association

President, Walter L. Seelbach, Walworth Run Foundry Co., 2488 West Twenty-seventh street, Cleveland; secretary-manager, Arthur J. Tuscany, 5713 Euclid avenue, Cleveland.

Philadelphia Foundrymen's Association
Philadelphia

President, Walter Wood, R. D. Wood & Co., Philadelphia; secretary Howard Evans, J. W. Paxson Co., Luzerne and D streets, Philadelphia. Meetings the second Wednesday of each month at the Manufacturers' club.

Pittsburgh Foundrymen's Association
Pittsburgh

President, Lawrence V. Stevens, Locomotive Stoker Co., N. E. Pittsburgh; secretary-treasurer, William J. Brant, Wm. J. Brant, Bessemer building, Pittsburgh. Meeting on the third Monday of the month, except in July and August, at Fort Pitt hotel.

Quad-City Foundrymen's Association
Davenport, Iowa

President, J. H. Diedrich, Blackhawk Foundry & Machine Co., Davenport, Iowa; secretary-treasurer, A. D. Ziebarth, Davenport Foundry & Machine Co., Davenport, Iowa. Meetings the third Monday evening of each month, the meeting place being rotated between Moline, Rock Island and Davenport.

Southern Metal Trades Association
Atlanta, Ga.

President, George B. Cocker, Gastonia, N. C.

Tri-City Technical Council
Moline, Ill.

Chairman, H. Bornstein, Deere & Co., Moline, Ill.; treasurer, Max Sklovsky, Deere & Co., Moline, Ill. Combined meetings held only one or two times a year on call.

Tri-State Foundrymen's Association
Cincinnati

President, Harold P. Ritter, John A. Oberhelman Foundry Co., 3323 Colerain avenue; secretary, George W. Piehl, Wessling Bros. Foundry Co., 1607 McLean avenue. Meetings the second Thursday of each month at the Cincinnati club, Eighth and Race streets.

Twin City Foundrymen's Association
Minneapolis-St. Paul

President, J. A. Teach, Minneapolis Steel & Machinery Co., Minneapolis; secretary-treasurer, C. E. Langdon, 3849 Lyndale avenue, So., Minneapolis. Meetings monthly at the Athletic club.

Delay Equipment Purchases

Although January Sales Show Improvement Over December Total, Many Plants Fail To Take Action on Inquiries Out Some Time

SALES of foundry equipment have not recovered to the extent anticipated several months ago. The one possible exception to this condition is found in the Chicago territory where the market has shown a considerable pickup during the past two weeks. Manufacturers in that district report January business ahead of sales in December. While buying for new foundry construction is scarce, equipment is being secured to cut production costs.

Orders continue to lag slightly in the Cleveland district although considerable interest is being shown in various types of equipment. Several large automobile foundries are expected to close on a good volume of equipment shortly.

The eastern foundry equipment market is devoid of large orders. However, operations of foundries are improving, especially among plants specializing in pipe and railroad work, so that an early betterment in equipment demand seems likely. In most instances sales in January were heavier than in December. One factor preventing large orders is the lack of new construction. Demand for melting equipment and sand handling equipment is dull.

Limited sales and curtailed inquiry are the features of the market in the Pittsburgh district. The latter part of January was more quiet than the first two weeks with respect to sales. A large number of propositions still are pending involving expenditures for which appropriations have not been made as yet.

While conditions in the New England market are promising, sales since the first of the year have not been heavy. The Pratt & Whitney Mfg. Co., Hartford, Conn., has purchased electric core ovens and is in the market for other electrical oven and furnace equipment. The Milbury Steel Foundry Co., Milbury, Mass., is building a plant addition. The Barbour-Stockwell Co., Cambridge, Mass., has been installing new equipment and recently purchased additional molding machine equipment.

CHICAGO MARKET

Furnaces

Morris Foundry, Fond Du Lac, Wis., 650-pound stationary type preheated air furnace; Algonac Brass Foundry, Algonac, Mich., stationary type furnace from the U. S. Industrial Engineering Co., Cleveland.

Molding Machines

Commonwealth Steel Co., Granite City, Ill., two machines from the Herman Pneumatic Machine Co., Zelienople, Pa.

Sandblast Equipment

University of Illinois, Urbana, Ill., Anacortes Foundry Co., Anacortes, Wash., sandblast equipment from the Pangborn Corp., Hagerstown, Md.

Sand Preparing Equipment

John Deere Harvester Co., East Moline, Ill., Pettibone-Mulliken Co., Chicago, sand separators and blenders from the Royer Foundry & Machine Co., Wilkesbarre, Pa., through Page & Ludwick, Chicago.

West Michigan Steel Foundry Co., Muskegon, Mich., Rundle Mfg. Co., Milwaukee, sand mixers from the National Engineering Co., Chicago.

Shakeout Equipment

Wilson Foundry & Machine Co., Pontiac, Mich., Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., vibrator and shakeout equipment; Weil-McLain Co., Michigan City, Ind., shakeout bails; from the Stoney Foundry Engineering & Equipment Co., Cleveland.

NEW YORK MARKET

Dust Arrester Equipment

J. G. Brill Co., Philadelphia; Vickers Commonwealth Steel Co., Warath, Australia; dust arrester equipment from the Pangborn Corp., Hagerstown, Md.

Furnaces

Essex Brass Co., Newark, N. J., one 825-pound tilting type preheated air furnace from the U. S. Industrial Engineering Co., Cleveland.

Sandblast Equipment

North West Foundries Co., Rochester, N. Y.; Westinghouse Electric & Mfg. Co., Newark, N. J., sandblast equipment from the Pangborn Corp., Hagerstown, Md.

Florence Pipe Foundry & Machine Co., Florence, N. J. Sale of sandblast room as reported in Dec. 15 issue in error. Business not yet closed.

Sand Preparing Equipment

Rider-Ericsson Engine Corp., Walden, N. Y., one sand separator and blender from the Royer Foundry & Machine Co., Wilkes-Barre, Pa., through Alexander Haigh, Boston.

American Manganese Steel Co., New Castle, Del., sand mixer from the National Engineering Co., Chicago.

Boynton Furnace Co., Boynton, N. J., sand mixer with screen from the Standard Sand & Machine Co., Cleveland.

NEW ENGLAND MARKET

Molding Machines

Barbour-Stockwell Co., Cambridge, Mass., two; Gilbert & Barker Mfg. Co., Springfield, Mass., two; from the Tabor Mfg. Co., Philadelphia.

Sand Preparing Equipment

U. S. navy yard, Boston; Davis & Furbar Machine Co., North Andover, Mass.; sand separators and blenders from the Royer Foundry & Machine Co., Wilkes-Barre, Pa., through Alexander Haigh, Boston.

CLEVELAND MARKET

Furnaces

Ohio Brass Co., Mansfield, O., one stationary type furnace; Cleveland Graphite Bronze Co., Cleveland, one tilting type furnace from the U. S. Industrial Engineering Co., Inc., Cleveland.

Standard Stoker Co., Erie, Pa., oven and furnace from the Mayor Fuel Saving Furnace Co., Cleveland.

Ladles

Cincinnati Steel Casting Co., Cincinnati, six special ladles from the J. S. McCormick Co., Pittsburgh.

Sandblast Equipment

Metric Metal Works, Erie, Pa.; W. S. Tyler Co., Cleveland, sandblast equipment from the Pangborn Corp., Hagerstown, Md.

Sand Preparing Equipment

American Foundry & Machine Co., Hamilton, O.; Tennessee Coal, Iron & Railroad Co., Ensley, Ala., sand mixers from the National Engineering Co., Chicago.

Farrel-Cheek Steel Foundry Co., Sandusky, O., sand separator and blender from the Royer Foundry & Machine Co., Wilkes-Barre, Pa., through the Mayor Fuel Saving Furnace Co., Cleveland.

Shakeout Equipment

Griffin Wheel Co., Detroit, Ferro Machine & Foundry Co., Cleveland; Ohio Malleable Iron Co., Columbus, O., vibrator and shakeout equipment from the Stoney Foundry Engineering & Equipment Co., Cleveland.

Tumbling Barrels

Capitol City Brass Foundry Co., Columbus, O., one water tumbling barrel from the J. S. McCormick Co., Pittsburgh.

PITTSBURGH MARKET

Cranes

Allegheny Steel Co., Brackenridge, Pa., one 15-ton crane from the Shaw Electric Crane Works, Muskegon, Mich.

Dust Arrester Equipment

Standard Engineering Co., Ellwood City, Pa., Keystone Driller Co., Beaver Falls, Pa., Dick Bros. Inc., Reading, Pa., dust arrester equipment from the Pangborn Corp., Hagerstown, Md.

Furnaces

New Holland Brass, Bronze and Aluminum Co., New Holland, Pa., a 450-pound tilting type furnace from the U. S. Industrial Engineering Co., Cleveland.

Molding Machines

Gibson & Battle Co., Sydney, Australia, one roll-over machine from the Herman Pneumatic Machine Co., Zelienople, Pa.

Sandblast Equipment

Jones & Laughlin Steel Co., Pittsburgh, sandblast equipment from the Pangborn Corp., Hagerstown, Md.

Miscellaneous

National Radiator Co., New Castle, Pa., blower from the General Electric Co., Schenectady, N. Y.

What the Foundries Are Doing

Activities of the Gray Iron, Malleable, Steel and Brass Shops

Novelty Iron Works, Sterling, Ill. is having plans made for rebuilding its burned plant.

B. T. Earle, 248 Pine Street, Spartanburg, S. C., will build a foundry on St. John street, 25 x 100 feet.

Lufkin Foundry & Machine Co. will build a 1-story addition for which equipment will be required. (Noted Dec. 15, 1926).

Weber Engine Works, Twelfth and Winchester streets, Kansas City, Mo., will build a 1-story foundry 50 x 100 feet.

U. S. Electrical Mfg. Co., 200 East Slauson street, Los Angeles, C. E. Johnson vice president, has awarded a contract for a nonferrous foundry.

Parkersburg Rig & Reel Co., Parkersburg, W. Va. has let contract to the Austin Co. for a new plant 125 x 242 feet, one-story, to be followed by other units.

Rush Mfg. Co., Lafayette, Ind. has been incorporated with $50,000 capital to conduct a general foundry business by H. H. Johnson, G. L. Potter and J F.. Bellinger.

Union Radiator Co., Johnstown, Pa., is having plans drawn for a new plant by Gray & Cloflin, Swank building. (Noted Nov. 15, 1926).

Cockshutt Plow Co., Brantford, Ont. will build foundry addition 70 x 70 feet. Construction work will be started, at once, and new machinery and tools will be purchased.

The Titusville, Pa., works of the American Radiator Co., which has been idle for two months, has resumed operating on a full time basis, employing about 200 men.

National Foundry & Furnace Repair Co., Bolander avenue, Dayton, O., has let contract to Industrial Building Co. for a 1-story foundry addition.

Mechanical Pattern Works, Inc., Vernon, Calif., has changed its name to Mechanical Pattern & Foundry Co. Inc., and has moved its office to 4545 Pacific boulevard.

Grand Rapids Adjustable Piston Corp., Grand Rapids, Mich. has been incorporated with a Delaware charter, with $700,000 capital to manufacture iron, steel and copper products by Louis Vingeroets, Grand Rapids.

H. & H. Foundry Machine Co. has been incorporated with $30,000 capital to manufacture castings and other foundry products by C. B. Hoffman, Jeanette, Pa., A. J. Hamilton and L. P. Hamilton.

Fulton Sylphon Co., is being organized at Knoxville, Tenn., to take over the business of the Fulton Co., manufacturer of valves and regulators. Weston M. Fulton heads the new company.

Milbury Steel Foundry Co., Milbury, Mass., is building a 110 foot by 36 foot addition to its molding floor. The added space will be used for new equipment and to give a better general layout throughout the plant.

Century Electric Co., St. Louis, E. S. Pillsbury president, 1806 Pine street, is having plans drawn for a 2-story addition 240 x 400 feet for foundry and other purposes, at 3739 Market street.

Helwig Iron Works, 69 Almaden avenue, San Jose, Calif., will build a 1-story foundry plant.

Northfield Foundry & Machine Co., Northfield, Minn., will build an addition 40 x 105 feet, plans now are being prepared.

T. & S. Casting Co., Brooklyn, N. Y., has been incorporated with $5000 capital to manufacture brass products by W. W. Tennant, S. S. Smith and J. Loccisano. H. Van Alst, Long Island City, N. Y., is attorney.

Allen Mfg. Co., Nashville, Tenn., manufacturer of stoves, W. J. Allen president, has increased its capital from $75,000 to $500,000 and will add largely to its plant, including a foundry, enameling department and warehouse.

Roselle Foundry Co., Oak street, Roselle, N. J., will build a 1-story addition 80 x 100 feet adjoining its plant. Joseph Anderson, 251 North Broad street, Elizabeth, N. J., is architect.

J. J. Glennon Foundry Co., Kearny, N. J. has been incorporated with $50,000 capital to operate an iron foundry by John J. Glennon, Joseph T. Glennon and Catherine L. Glennon. Moriarity & Lenhan, Jersey City, N. J., are attorneys.

Holzworth Bronze Co., Niagara Falls, N. Y. has been incorporated with $50,000 capital and 500 shares no par value by E. H. Holzworth, C. R. Holzworth and W. C. Holzworth. Kennefick, Cooke, Mitchell & Bass, Buffalo, are attorneys.

Strickland Foundry & Machine Works Inc., 556 West Thirty-fourth street, New York, Arthur H. Strickland president, has leased a larger plant at 520 West Thirty-sixth street and will remove there and increase output.

Automatic Couplings Ltd., St. Johns, Que. has been incorporated to carry on the business of iron foundry, mechanical and electrical engines, with a capital of 3600 shares of no par value by Alfred T. Howell, Paul Monet, Esther Wilson and others.

Gable Brothers Ltd., Montreal, Que. has been incorporated to carry on the business of blacksmith, millwright, foundryman, wood and iron worker, with a capital of 50,000 shares of no par value by Kellard Gamble, William L. Gamble, Roy Anderson and others.

Columbiana Foundry Co., McKeesport, Pa., iron castings manufacturer, has bought part of a plant in Sterling township formerly occupied by Firth-Sterling Steel Co., and will remodel and equip for its enlarged production. (Noted Oct. 15, 1926).

Barberton Foundry Co., Barberton, O., has delayed building its proposed addition until plans can be made for a more extensive construction. First plan for an addition to existing structures has been discarded and a complete steel foundry plant will be built.

Eastern Malleable Iron Co. with plants at Naugatuck, Bridgeport, New Britain, Conn., at Troy, N. Y., and Wilmington, Del., has recently purchased the Malleable Iron Works of New Britain, Conn., formerly owned by Henry & Allen of Auburn, N. Y. (Noted Aug. 1, 1926).

G. W. Mocky, Milwaukee, and Conrad Schopp, Racine, Wis., have bought the foundry at Kalamazoo, Mich., formerly operated by the Hill Curtis Co. and will start operations about Feb. 1. Light and gray iron castings for the jobbing trade will be produced.

Lidgerwood Mfg. Co., 326 Frelinghuysen avenue, Newark, N. J., has bought a site at Elizabeth, N. J., on which it will build a plant. The machinery plant will be 120 x 600 feet, foundry 120 x 400 feet, with pattern shop, power house, office building and warehouse.

Erie Electrical Construction Co., Johnstown, Pa. has been incorporated with $100,000 capital to manufacture electrical appliances, including castings for them, by I. J. Bowman, 736 Somerset street, Johnstown, Pa., John J. Mulvehill, 634 Somerset street, and Frank P. Barnhart.

Magnus Co. Inc., Waynesboro, Pa., has been incorporated with $100,000 capital to manufacture castings and other metal products by J. P. Murray, 921 South Fiftieth street, Philadelphia, W. H. Croft, 80 West Jackson boulevard, Chicago, and J. W. McAuliffe, 140 South Dearborn street, Chicago.

Bettendorf Co., Bettendorf, Iowa, manufacturer of steel railroad cars, steel underframes and other railroad supplies, is about to occupy its new office building, which is practically completed. It is three stories, 77 x 140 feet, of brick and stone and modernly equipped. Quarters are provided for all departments of activity.

Adams & Westlake Co., manufacturer of ship hardware, railroad signal lamps, automobile accessories, railroad car and shiplighting fixtures, which has been located in Chicago since 1867, will remove its plant to Elkhart, Ind. The present plant at 319 West Ontario street, Chicago, is close to the center of the city and is too valuable for industrial use. The company owns a large interest in the Curtain Supply Co., Elkhart, Ind., and the two plants can be operated together as an economy.

Purchase of the plant and real estate of the Enterprise Foundry Co., Indianapolis has been announced by Charles J. Gisler, president and general manager of the C. & G. Foundry & Pattern Works, also of Indianapolis. The plant will be overhauled and put into full operation within sixty days. It has been closed a year. The new plant will be operated as an iron foundry in connection with the Kentucky avenue plant of the C. & G. company, which manufactures brass, bronze and aluminum castings and wood and metal patterns.

It is reported that National Castings, Ltd., whose plant at Belleville, Ont., was recently destroyed by fire, now proposes to establish its plant at Campbellford, Ont. The new plant will be on more modern lines and will include an electric furnace with a capacity of about 2 tons per day. The company will manufacture small steel and alloy castings and other lines of railway equipment. Those interested in the company include S. B. Wright, manager of the Deloro Smelting & Refining Co.; T. A. Brown of Toronto; N. L. Turner, Belleville, Ont.; J. C. Birmingham and F. S. Lozier of Campbellford, Ont. (Noted Aug. 1, 1926).

Universal Pipe & Radiator Co., the parent company of a complete group of industries, which owns and operates foundries, a blast furnace, mines and coke ovens, will move, with its affiliated companies, from their present quarters in New York to the Graybar building adjoining the Grand Central Terminal about the time this building is completed in April. The move is to improve office facilities and to obtain more space. Officials of the parent company are: Chairman, George A. Hardor; president, Louis B. Ladoux; vice president, B. A. Schultz; secretary, B. L. Klynn, and treasurer, E. McElheaney. The other companies making this move in addition to the Universal Pipe & Radiator Co. are the Central Foundry Co., Central Iron & Coal Co., Central Radiator Co., Central Foundry Co., Molby Boiler Co. and Essex Foundry.